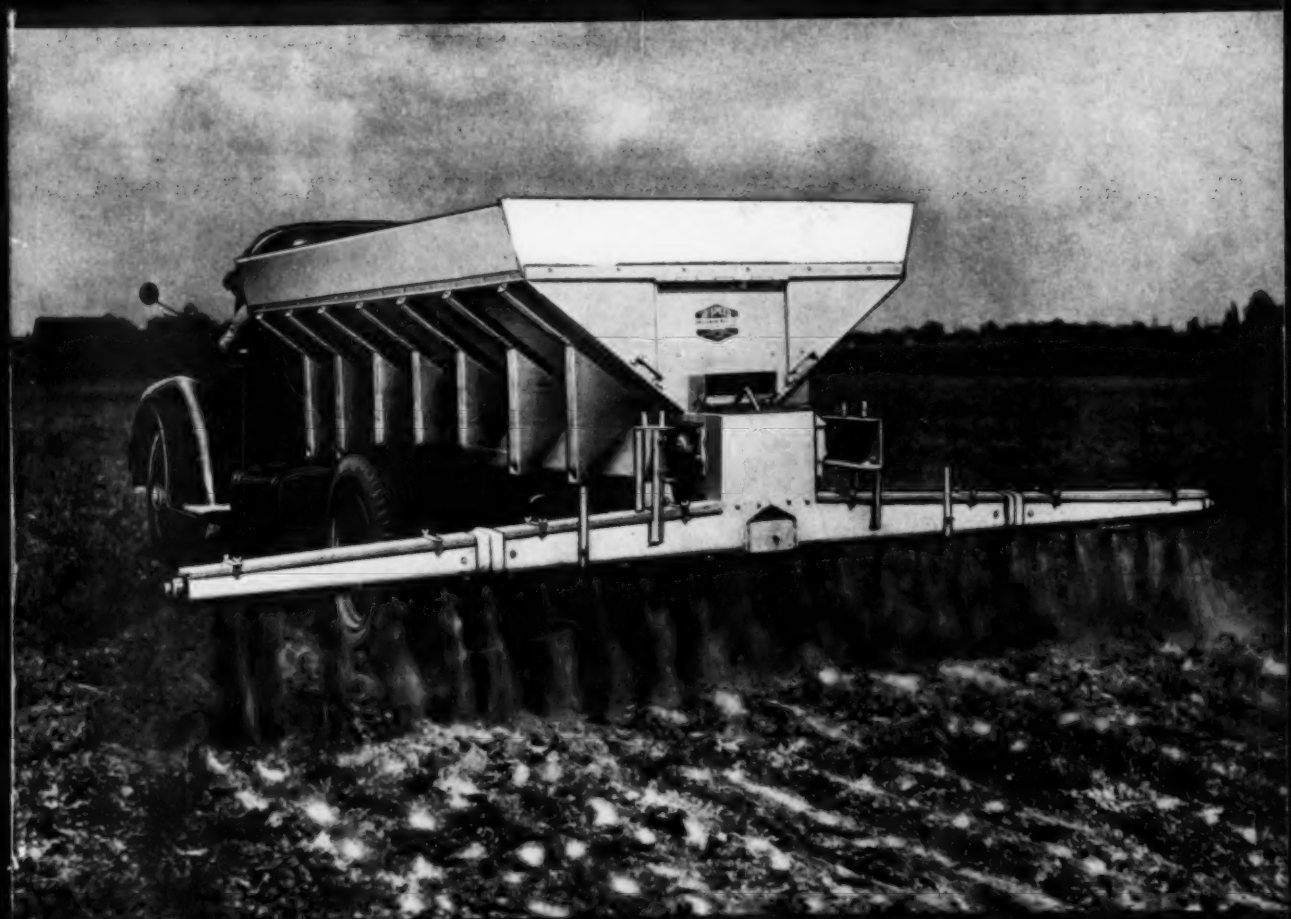
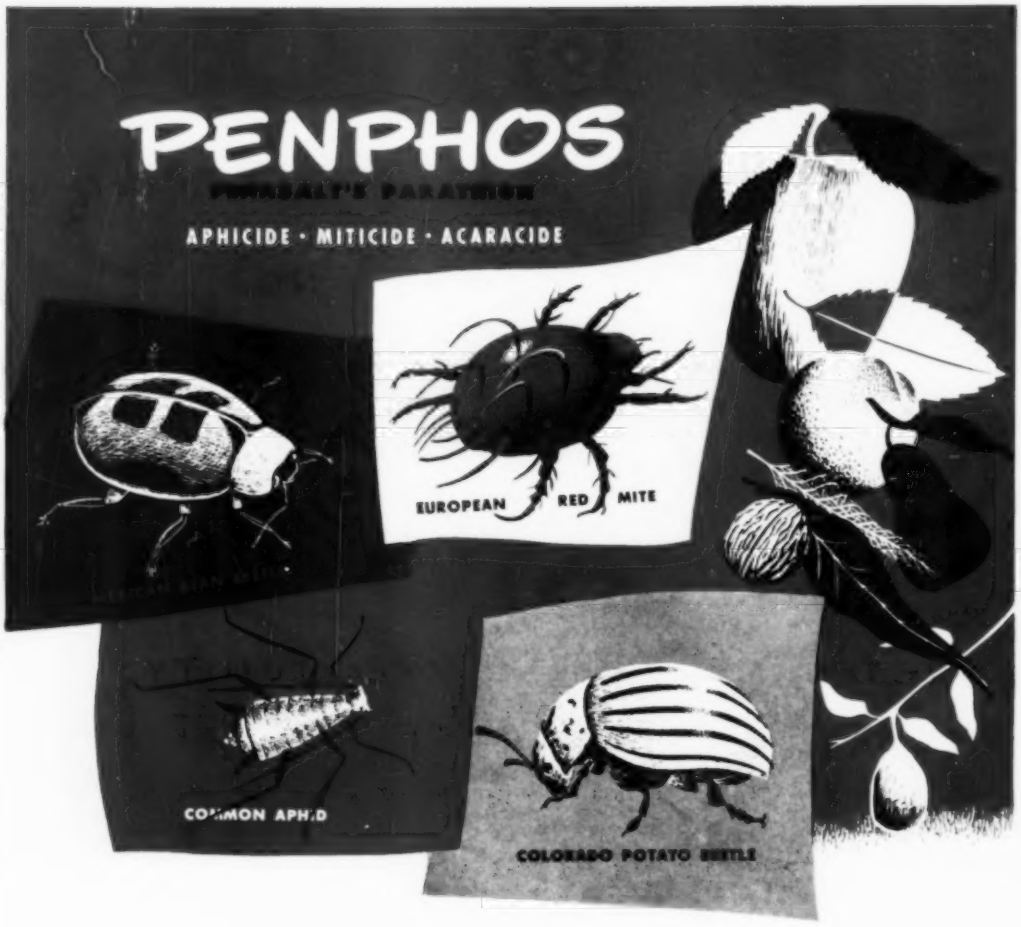
# AGRICULTURAL CHEMICALS



JANUARY, 1949 • MEETING REPORTS: ENTOMOLOGISTS, PESTICIDES, N. CENTRAL WEED CONFERENCE, FERTILIZER SITUATION • KETP IN AEROSOLS • PESTICIDE MARKET OUTLOOK • TECHNICAL DIGESTS: PATENTS • COMMERCIAL FERTILIZERS STAND TEST OF 1948 • INDUSTRY NEWS • TRADE MARKS

Volume IV January, 1949 Number 1




**PENPHOS***—containing the new organo-phosphate material parathion is now ready for prompt shipment by Pennsalt.

During extensive field tests in 1948, PENPHOS, with parathion as the active ingredient, showed high insecticidal efficiency for the control of: Aphids on many fruits, walnuts and vegetables; Red Spider and Mites; Prune Bud Moth; Pear Psylla; Mexican Bean Beetle; Colorado Potato Beetle; Red-Banded Leaf Roller, and certain other insects.

Pennsalt products mean economical and effective insect control. That's because Pennsalt carefully controls the manufacture of its quality insecticide products—assuring top-quality, steady supply, and adequate technical field service.

**PENPHOS** is available in the following formulations:

**PENPHOS W-15**—a wettable powder containing 15% parathion for use in water suspension sprays. Packaged in 3 lb. bags, 16 to the case, and in 25 and 50 lb. drums.

**PENPHOS D-25**—a dust concentrate containing 25% parathion for use in the formulation of less concentrated dusts. Available in 50 and 100 lb. drums.

*Write, call or wire for Bulletin Penphos-1, giving complete recommendations for use of W-15 and recommendations to manufacturers of mixed dusts on handling D-25, labeling and packing the finished insecticide.* ***Agricultural Chemicals Division, Pennsylvania Salt Manufacturing Company,*** *Philadelphia 7, Pa. • Bryan, Texas • Tacoma, Washington.*

*PENNSALT MFG. CO.

PENN SALT

*agricultural chemicals*


# Quality and Service

You are assured on two important points — even in today's abnormal market — when you deal with P. C. A.

1. Quality . . . our Red Indian products are of unquestioned excellence.
2. Service . . . we make every effort to give you the service you want and deserve.

When better service is possible be assured P. C. A. will give it. Meanwhile your confidence, and your patience are greatly appreciated.

## POTASH COMPANY OF AMERICA

**CARLSBAD, NEW MEXICO**

GENERAL SALES OFFICE . . 50 Broadway, New York, N. Y. • MIDWESTERN SALES OFFICE . . First National Bank Bldg., Peoria, Ill.
SOUTHERN SALES OFFICE . . Candler Building, Atlanta, Ga.


CAKING and agglomeration are the all-too-familiar enemies of dust concentrate producers. They hamper production and harm product utility. But there's a way to stop these enemies dead in their tracks. Formulate with Attaclay.

Attaclay goes right to work in superfine grinders, mixers, liquid impregnators. Because of its natural flowability and adsorptive power, it accepts higher percentages of toxicant, yet remains dry, loose, lump-free. The capacity of mills is increased by as much as 50%. Dust manufacture is off to a flying start.

The pace doesn't slacken during packaging steps. Attaclay-mixed dusts are noted for getting full capacities out of materials-handling and package-filling machines.

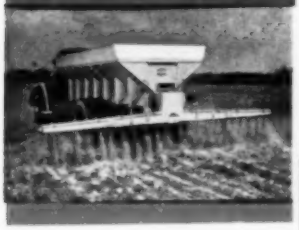
Finally, this high degree of fluidity persists over long periods of storage, assuring your customers a free-flowing, easy-to-handle dust base.

There's a good chance Attaclay can make your production set-up more hurried and less harried. A generous working sample should furnish proof. Write today and we'll send it.

**ATTAPULGUS CLAY COMPANY**

Dept. P, 210 West Washington Square, Phila. 5, Pa.

AGRICULTURAL CHEMICALS



**THIS MONTH'S COVER**

Use of ground rock phosphate for direct application to the soil is working out well in certain parts of the country. Economies in freight and spreading and advantages in storing and timing are reported from midwestern areas. Photo shows application direct from truck. (Photo courtesy of National Fertilizer Association, Washington, D. C. and Prof. A. L. Lang, Univ. of Illinois, Urbana).

JANUARY 1949
VOL. IV No. 1

**A Monthly Magazine For the Trade**

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## *In This Issue:*



**AGRICULTURAL CHEMICALS**

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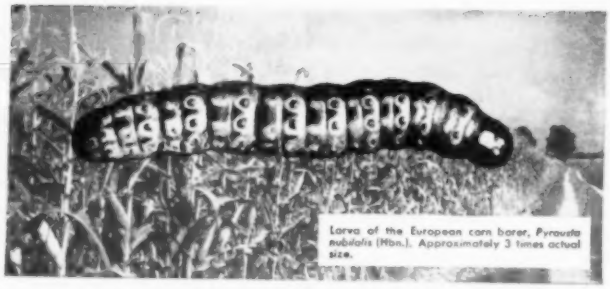
FOR YOUR INFORMATION



Larva of the European corn borer, *Pyrausta nubilalis* (Hbn.). Approximately 3 times actual size.

# EXPANDED USE OF SANTOBANE NEEDED FOR MORE EFFECTIVE BORER CONTROL IN 1949

The coming season will see greater use of Santobane (Monsanto DDT) in the farmer's annual battle with the corn borer. Formulators of agricultural chemicals can do much toward winning the battle—by encouraging more intensive control with this powerful weapon. Halfway measures are not enough, since losses are growing year by year as the insect invades and becomes abundant in new areas . . . In 1947 the pest caused damage estimated at nearly $97,000,000—a figure undoubtedly exceeded in 1948.

Insecticidal treatment is not the whole answer to corn borer elimination . . . The farmer must also follow approved planting and plowing procedures — destroy infested growth as recommended by the U.S.D.A. and local agricultural authorities. Santobane will, however, provide excellent control of new infestation when applied at the right time in the right manner.

**HERE'S HOW THE EUROPEAN CORN BORER IS SPREADING IN THE UNITED STATES**

Areas known to be infested prior to 1947.

Areas reported as being infested for the first time in 1947.

Formulators and manufacturers of insecticides will find Santobane ideal for use in all agricultural applications involving DDT. Its uniform, free-flowing, granular characteristics allow it to be readily solubilized, emulsified or milled . . . For latest technical data, samples and prices, address Monsanto, Organic Chemicals Division.

## HISTORY OF CORN BORER
### ITS DISTRIBUTION IN NORTH AMERICA*

When the European corn borer was first reported and identified in North America in 1917, it was found to be causing severe damage to sweet corn in the vicinity of Boston, Mass., and to be present in a district comprising at least 100 square miles.

Subsequently it was learned that as early as 1917 the borer was also present in the vicinity of St. Thomas, Ontario, Canada, and in the districts centering around Schenectady and Silver Creek, N. Y.

The exact date on which this dangerous pest gained entrance to North America is not definitely known, but circumstantial evidence accumulated since its original discovery indicates strongly that broomcorn, imported from Hungary or Italy during the period from 1909 to 1914, was the probable means of entrance. The quarantine inspection service at ports of entry was not authorized by law until 1913, or subsequent to the probable original entry of the corn borer into this country.

The multiple-generation strain of the borer has been found over practically the entire infested area (shown on map), although its proportion to the single-generation strain varies in different localities, reaching its maximum in the southern infested counties and diminishing toward the north. Wherever the multiple strain is present the number of generations is established by the nature of the environment. A short season in the northern portions of the area is conducive to a single generation, while the long season on the eastern shore of Virginia allows the development of three generations annually. The insect has been found at several isolated points at some distance from the area of general infestation.

### STRONG FLYERS

The corn borer moths are strong flyers, and it is believed that the extension of the infested area each year is caused principally by flight. Experiments have shown definitely that corn borer moths are able to fly for a distance of at least 20 miles, and judging from their general habits it is probable that they can and do fly greater distances. Large bodies of water do not check their flight, as the moths have been seen to alight on the surface of the water and again take flight. Experiments have also shown that the moths were able to reach cornfields surrounded by high hills or woodlands. During windy periods flight is usually with, or in the direction of, the wind.

### CAN SURVIVE SUBMERSION

It is also known that, when hidden in cornstalks, the larvae can survive long periods of submersion in fresh or salt water. This fact, plus the fact the cornstalks are known to have been borne long distances in the currents of rivers, lakes, and the ocean, indicates that many of the new infestations along the North Atlantic seaboard, in the Great Lakes region, and along the river courses of the present infested area have had their origin in water-borne infested cornstalks or other infested plant material.

*From "The European Corn Borer," U. S. D. A. Farmer's Bulletin No. 1548.


### RECENT U.S.D.A. PUBLICATION GIVES LATEST BORER DATA

Revised in September 1948, this booklet contains much valuable information on corn borer damage and control. Known as U. S. Department of Agriculture Farmer's Bulletin No. 1548, it is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 15c per copy.

(MORE ABOUT CORN)

# 2,4-D
## WEED CONTROL INCREASES YIELD 11% TO 49%

"In 1947, about 45,000 acres of Kentucky, Iowa, Indiana and Pennsylvania corn that had grown up to weeds during a period of wet weather were saved from ruin by being treated with 2,4-D. An average of 60 bushels per acre was harvested. In Nebraska more than 50,000 acres were treated and estimated gains of 11 to 49% in production resulted."*

Results such as these show that proper application of Monsanto 2,4-D formulations will keep cornfields weed-free — increase yield by a profitable margin. Use of 2,4-D is especially recommended for wet lands in river and creek bottoms where most of the weeds are of broadleaf types—the kind most susceptible to 2,4-D.

### ATTENTION, FORMULATORS

1949 weed control requirements now appear to be quite large. Herbicide formulators are therefore invited to contact Monsanto promptly regarding their needs for 2,4-D Acid, 2,4-D Sodium Salt and 2,4-D Isopropyl Ester—all manufactured to exacting standards of purity and uniformity. Ask also for latest literature and technical bulletins on weed control with Monsanto 2,4-D.

## SUGGESTIONS FOR KEEPING CORNFIELDS WEED-FREE WITH MONSANTO 2,4-D*

**"USE MINIMUM QUANTITY**—When treating corn with 2,4-D it is recommended that no more than the minimum quantity per acre (½ to ¾ pound on the acid basis) be used. When the chemical is in "ester" form about 25 per cent less should be used than when it is in "amine" or "salt" form. Rate of application and type of equipment are essentially the same as for small grains.

**"USE CAREFUL TIMING**—While there is some difference of opinion as to the best time to apply 2,4-D, most authorities say it should not be applied before the corn is 8 inches high. Local conditions have an influence in this regard. The county agent should be consulted about both the quantity to be used and timing of the application."

(The pre-emergence treatment of cornfields with 2,4-D also shows great promise, but requires additional study before definite recommendations can be made.)

**"USE CAUTION**—Weed control by cultivation in corn on bottom lands often is extremely difficult because of wet fields. There are several million acres of such soils in the Mississippi, Missouri, and Ohio River valleys. *Weed specialists believe that use of 2,4-D in place of machine cultivators could bring an average increase of 10 bushels per acre in production of corn on these lands, year after year. But, they say, the job must be done carefully or crop losses instead of gains may result."*

*From "Weeding Small Grain and Corn," Fact Sheet No. OFFC-8, U. S. Department of Agriculture.

### 2,4-D CONTAINERS

Dispose of all 2,4-D containers in such a way that they cannot be re-used. Fibre, paper and wooden packages should be burned to eliminate the possibility of contaminating other products.

### MUCH USEFUL INFORMATION IN U.S.D.A. FACT SHEET

Helpful hints for formulators and users of 2,4-D are contained in "Weeding Small Grain and Corn," Fact Sheet No. OFFC-8, available from the U. S. Department of Agriculture. We suggest that you write for a copy.

## OTHER MONSANTO INSECTICIDAL CHEMICALS

## NIFOS...NIFOS-T
### GREENHOUSE ROSE GROWERS BOOST PRODUCTION

The protection from mites and aphids afforded by formulations of Nifos (Monsanto Hexaethyl Tetraphosphate) and Nifos-T (Monsanto Tetraethyl Pyrophosphate) is resulting in greatly increased rose production by greenhouse growers. Treatment with recommended aerosol formulations is simple, inexpensive and highly effective.

Nifos and Nifos-T are also useful for the control of destructive insect pests of farm, garden and orchard. Both products are quick-acting—do not present a residual toxicity problem.

Formulators of agricultural insecticides are invited to write for full details on these profitable applications of Nifos and Nifos-T. Address Monsanto, Organic Chemicals Division. *Nantahane, Nifos, Reg. U. S. Pat. Off.*

• • •

MONSANTO CHEMICAL COMPANY, Desk A, Organic Chemicals Division, 1766 South Second St., St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Akron, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada) Limited, Montreal.

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY
Desk A, Organic Chemicals Division
1766 South Second Street, St. Louis 4, Missouri

Please send me further information on: _____

Name _____ Title _____

Company _____

Type of Business _____

Address _____

City _____ State _____


A CAREFUL diagnosis would probably reveal a lack of uniformity in your insecticide product — caused by inefficient or outmoded equipment . . . unsuited to the specialized job of producing a lump-free blend of high uniformity.

In over 30 states, satisfied users of Sprout-Waldron Intimate Blending Systems keep their customers happy. They have found the cure for SPATULITIS through low-cost, quality production.

As so successfully demonstrated in widely diversified installations, a Sprout-Waldron System is adaptable to the most rigid requirements of every dust producer.

When you buy Sprout-Waldron, you get a complete system engineered and specified in every detail by experienced men for greater production and a top quality product. The extras are: high efficiency . . . low operating costs . . . a safe, dust-free plant.

We believe that you realize the importance of planning now for your Intimate Blending System. Accordingly, we are prepared to make specific recommendations to meet your individual installation requirements anytime at your convenience. Consult Sprout-Waldron and Company, 7 Waldron St., Muncy, Pennsylvania.

SPROUT WALDRON 98
Manufacturing Engineers

*For Spraying Well Done . . .*

# The CHAMPION

## PORTABLE, ALL-BRASS SPRAYER

Wherever there is any amount of spraying of any liquid, solution or acid to be done, you can do it well and quickly with the Champion hand-powered, knapsack sprayer. It is the product of more than a quarter century of scientific development, precision manufacture, and experimentation with leading colleges and growers. Many thousands are in daily satisfactory use throughout the world.

The Champion is the one unit that combines all the desirable qualities of unusual power, simple operation, effective control, continuous agitation, and long life.



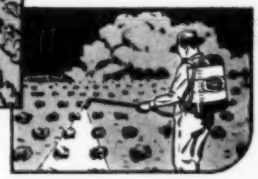


Discharge air chamber eliminates pulsation of outgoing liquid and thereby provides a continuous flow and a greater distance of spray in either a straight stream or fine mist.

Champion fits snugly on operator's back as he walks through greenhouse spraying to right or left, up or down.

Here's power to reach trees as high as 35 ft.

Reach under lowest plants without bending over.



Cover large area of crops quickly and effectively.

### SPECIAL CHAMPION BOOM for FAST WEED SPRAYING

For effective weed control, use Champion with concentrated weed killer solution and Boom No. 89. Boom has two Tee-Jet non-corrosive nozzles equipped with 100-mesh screen. Operator can spray path 36" wide wherever he can walk at rate of 4 gals. of concentrated solution per acre.

Champion is an all-purpose, portable sprayer. With it you can spray

**INSECTICIDES • FUNGICIDES • ACIDS • OIL • DDT**
**WATER PAINT • WEED KILLER SOLUTIONS**

Virtually any liquid can be used without affecting the synthetic rubber piston and the non-corrosive brass parts. There can be no clogging of the nozzle because the liquid is filtered twice and kept well agitated. Tank is all-brass. Pressure is confined to the piston cylinder, which is made of heavy, seamless brass tubing. Champion flexibility enables you to spray a fine mist or a 35-foot stream up, down, or in any direction. Form-fitting tank is held comfortably on operator's back by adjustable straps.

*Jobber and Dealer territories open. Write for details.*

**CHAMPION SPRAYER CO. 6541 Heintz Ave. DETROIT 11, MICH.**

*Manufacturers of Portable Sprayers and Dusters*

### *The Champion Line for '49*

**No. 100** Double-Action Duster

**No. 102** Knapsack Spot Duster

**No. 103** Hand Duster

**No. 204** Slide Sprayer with Tank

**No. 202** Utility Slide Sprayer

# CRAG

Trade-Mark

## FLY REPELLENT 1

### for dairy cattle and horse sprays— not hazardous to humans or animals

CRAG Fly Repellent 1, a butoxypolypropylene glycol, is a light colored liquid of medium viscosity and extremely low volatility. It is soluble in oil, insoluble but very readily dispersible in water. Its flash point is approximately 420° F. It weighs 8.25 pounds per gallon at 20° C.

Formulators will find this new CRAG Fly Repellent profitable in many ways:

— as the active component of oil-base or water-base repellent sprays

— as an additive for pyrethrum-containing insecticides where it steps up knock-down and kill

as a versatile solvent in DDT-base sprays. DDT dissolved in CRAG Fly Repellent is less toxic by skin absorption than DDT dissolved in a petroleum oil.

— as a component of aerosol-bomb sprays

Commercial quantities are available. For a sample and additional information, please return the coupon below.

**special advantages:**

- low toxicity to animals and humans
- wide compatibilities with insecticides
- pyrethrum synergism
- versatility of formulation
- freedom from odor and color
- solvent for DDT, DDD and methoxy DDT.

**repels:**

stable flies

horn flies

black flies

horse flies

midges

"CRAG" is a registered trade mark of CarCCC.

CARBIDE AND CARBON CHEMICALS CORPORATION
30 East 42nd Street, New York 17, N. Y.

Gentlemen:

Please send me, without obligation, an 8-oz. sample and technical information on the new CRAG Fly Repellent 1.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

**CARBIDE and CARBON**
**CHEMICALS CORPORATION**

*Unit of Union Carbide and Carbon Corporation*

30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

# for better control of more insects, insecticides containing

# Thiophos

REG. U. S. PAT. OFF.

## PARATHION

developed by American Cyanamid Company

Commercial use of THIOPHOS Insecticides in 1948 confirmed the outstanding results obtained experimentally in 1947. The following are among the more important insects killed easily and economically with Wettable Powders and Dilute Dusts manufactured from THIOPHOS Parathion:

| | | |
|---|---|---|
| APHIDS | RED-BANDED LEAFROLLER | PLUM CURCULIO |
| MITES | COTTONY-CUSHION SCALE | PEAR PSYLLA |
| THRIPS | ORIENTAL FRUIT MOTH | MEALY BUGS |
| BEETLES | WOOLLY APPLE APHID | BUD MOTH |

Because THIOPHOS controls destructive insects on practically every major crop, the demand will be heavy. The companies whose trade names appear on the opposite page will supply Dust Concentrates for making Dilute Dusts and Wettable Powders. Select one of these reliable manufacturers and arrange now for your supply of THIOPHOS Insecticides.

AMERICAN Cyanamid COMPANY

AGRICULTURAL CHEMICALS DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, N. Y.

# these well-known manufacturers supply THIOPHOS insecticides

DOW
PARATHION
The Dow Chemical Company
Midland, Michigan

CHIPMAN
PARATHION
Chipman Chemical Co., Inc.
Bound Brook, N. J.

Geigy
PARATHION
Geigy Company Inc.
New York, N. Y.

P.A.R.
PARATHION
Sunland Industries, Inc.
Fresno, Calif.

APHAMITE
PARATHION
The Sherwin-Williams Company
Cleveland 1, Ohio

PARADUST
PARATHION
Stauffer Chemical Company
San Francisco, Calif.

VAPOPHOS
PARATHION
California Spray-
Chemical Corporation
Richmond, Calif.

GENITHION
PARATHION
General Chemical Division
Allied Chemical
& Dye Corporation
New York, N. Y.

Phos Kil
PARATHION
Niagara Chemical Division
Food Machinery Corporation
Middleport, N. Y.

PENPHOS
PARATHION
Pennsylvania Salt
Manufacturing Company
Philadelphia, Pa.

PARATHION
INSECTICIDES
Tobacco By-Products
& Chemical Corporation
Louisville, Ky.

# NEW STANTOX "64" 2,4-D

## (Liquid Amine Salt) now contains a special ingredient to keep it from precipitating in most hard waters

● Last year our Stantox field men in hard water areas experienced one difficulty with Liquid Amine Salt 2,4-D sprays – the 2,4-D had a tendency to precipitate from the solution in the spray tank. So this year you'll find our Stantox "64" 2,4-D contains a hard water inhibitor to keep it from precipitating in the hardest waters . . . a selling point that will come in handy in this year's highly competitive 2,4-D market.

**STANTOX "P-44"**
**(an ester form of 2,4-D)**

For those "hard-to-kill," woody perennials and mature weeds.

available under your own private brand or our Stantox 2,4-D label

**STANTOX "70"**
**(Sodium Salt Powder)**

To round out the Stantox 2,4-D line, Stantox "70" can be used either as a dust or spray.

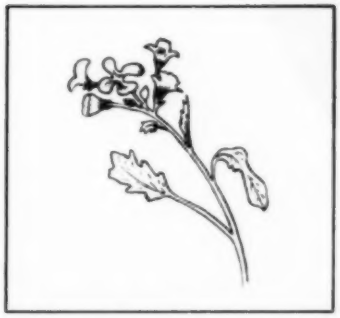
**2, 4-D**
ACID
SODIUM SALT
ISOPROPYL AND PROPYL ESTERS
ALKYLAMINE SALTS

**STANDARD AGRICULTURAL CHEMICALS, INC.**
1301 JEFFERSON STREET, HOBOKEN, NEW JERSEY

# POWCO

## 2,4-D WEED KILLERS

### IN MANY FORMS
### FOR SPECIFIC NEEDS



The wild mustard weed, thief of the grain field, is no problem when POWCO BRAND 2,4-D is on the job. There's a Powell 2,4-D concentrate to fit your particular need—Ester, Amine, Salt or Acid—for bottle, can, drum or carton. POWCO BRAND 2,4-D is completely water soluble . . . does not precipitate in hard water and is equally adaptable to low gallonage sprayers or standard spraying equipment. Remember, 2,4-D is still not readily available. Review your needs—*now!*

2,4-D AND INPC WEED KILLERS
DDT POWDERS AND LIQUIDS
BOTANICALS • ROTENONE • SABADILLA
PYRETHRUM POWDERS AND EXTRACTS
STIMTOX A
CHLORDANE POWDERS AND LIQUIDS
COTTON DUST CONCENTRATES
BHC POWDERS AND LIQUIDS
TOXAPHENE POWDERS AND LIQUIDS
TETRAETHYL PYROPHOSPHATE
ANTU
AEROSOL FORMULATIONS
PYRISCENTS (insecticide perfumes)
PYRINS

**John Powell & Co., Inc.**
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POWCO BRAND
REG. U. S. PAT. OFF.

KILLING POWER—THAT'S THE THING!

# THE EDITOR COMMENTS

HAD a file been drawn across the nerves of American industry, the effect would probably have been about the same as the reaction to the President's recent remarks about steel production in his report to Congress on the state of the union. His threat that, if steel output is not upped, the government may go into the steel business, carries too many implications in other directions to let it go by unchallenged. And challenged it has been with cries of "socialism" and similar unfriendly labels. Our reaction was that this reference was ill-chosen and ill-timed, and if the President and his party are anxious to engender complete and outspoken hostility on the part of industry, they have made an excellent start.

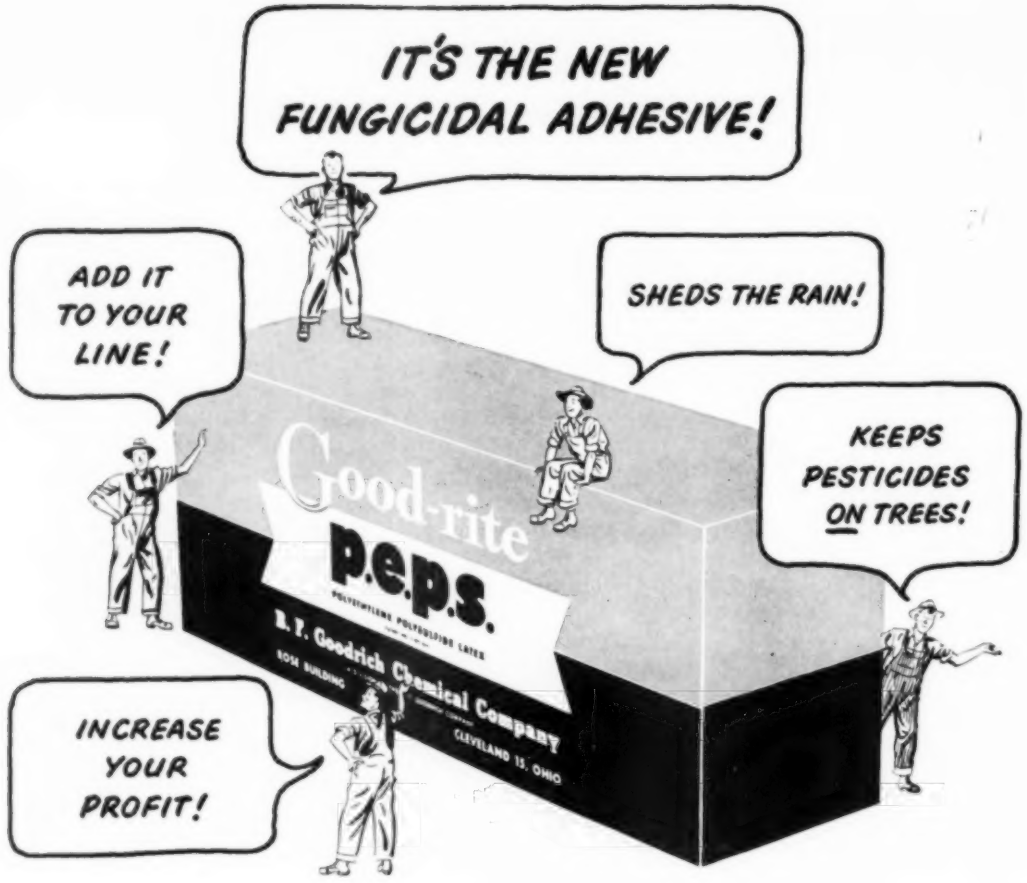
Heaven knows government is interfering in business enough as it is! Continuing along this same path,—if the economic history of Europe is any criterion,—such policy will eventually upset the American industrial apple cart. These planned economies, these government attempts to dictate the course and extent of industry progress, have all come to the same end,—failure. This steel production threat is cut with the same scissors,—and finds equal hostility in other industries, notably our own fertilizer industry. To label it as ill-chosen and ill-timed is in our blunt opinion putting it very mildly.

A WELL-KNOWN manufacturer of spray equipment in the mid-west is out to sell the idea of "a small power sprayer on every farm in the United States." Likening the sprayer situation on the average farm today to the running-water sales job which faced the pump manufacturers twenty years ago, this firm has announced its intention to get under way with its sprayer educational job this year,—to emphasize the obvious need for a power sprayer on *every* farm.

Applause for this plan was our first reaction. The more we thought about it, the better we liked it. Not only does it have merit in making the farmer power-sprayer conscious, to convince him that he needs such equipment, and to sell more sprayers both now and in the years to come, but it has what is obviously a slant that should likewise bring a strong supporting response from every manufacturer, mixer and dealer in fungicides, insecticides and herbicides. When the labor-saving equipment is handy and on the spot, its more frequent use is inevitable. No borrowing, no waiting for the spray man to come around, no costly delays while bugs or plant disease ruin the crop. And the effect on a wider and more frequent use of needed agricultural chemicals requires no explanation here or anywhere else.

This manufacturer is not out to sell his sprayers alone, but to sell the *idea* from which he knows that he will derive his proportionate benefits. We feel that the plan is an excellent one and we have offered every help which we can give in these columns to support it. More sprayer units bought,—more chemicals used. We're for it 100%!

THE idea, expressed before in this column, that the entomological and phytopathological societies would gain much by holding joint annual meetings, was brought out again at the recent APS meeting in Pittsburgh. Dr. Gordon Utter pointed out that the two groups have many common problems, emphasized by the current trend toward combining fungicide and insecticide applications. Questions of compatibility of materials, synergism, toxicology, residues, cooperative studies in experiment stations and recommendations to growers, call for the pooling of knowledge held by the two groups. And apart from the technological side, the matter of convenience and expense for many who must attend both meetings, should be considered. At any rate, it is encouraging to note that the idea is taking shape, and we hope that it will develop.




HERE'S the new fungicidal "sticker" that is growing in popularity with more and more fruit growers.

That's because Good-rite p.e.p.s. has the extra qualities fruit growers want—helps produce more saleable fruit.

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# New York AAEE Meeting Discusses Effectiveness and Toxicology of New Pesticide Chemicals

**Rohwer warns against overspecialization; fly resistance to DDT discussed; residues in soil studied; formulations stressed**

REPORTS on new insecticidal compounds, discussions of their toxicity to plants, animals and man, and effectiveness against numerous insect pests, were given before some 600 persons attending the sixtieth annual meeting of the American Association of Economic Entomologists at the Hotel New Yorker, New York, December 13-16. Dr. A. M. Boyce, Riverside, California, was elected president to succeed Dr. S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, U.S.D.A. Other officers named were C. P. Clauson, B.E.P.Q., vice-president, succeeding Dr. Boyce; and Dr. Ernest N. Cory, College Park, Md., to succeed himself as secretary-treasurer.

The Association heard its president, S. A. Rohwer, present an appraisal of entomology in general and entomologists in particular. Dr. Rohwer stated that entomologists tend too much toward "specializing in specialization." He pointed out that although specialization in the classification and identification of insects is essential, the separation of the science of entomology into various fields of endeavor has led to the development within the science of lines of cleavage which are neither justified nor desirable.

This does not mean there should not be fields and interests and aptitudes—these are necessary, he declared. Overspecialization, however, results all too often in loss of perspective. Where specialization is required—it is usually a clear indication that coordinated, cooperative effort is also necessary to get the answer that is needed for practical use.

Dr. Rohwer emphasized that insecticides must not only be effective in the control of insect pests, but they must also be practical and safe for the user and non-injurious to crops.

The A.A.E.E. president suggested also that improvement might be made in the cooperation of entomologists with each other. He said that being the first to discover a significant fact about insects or toxicants is not as important as being sure one is *correct*. Although entomologists have become better cooperators, they still have a long way to come before reaching the highest plane in this, he declared.

The establishment of a Section dealing with medical entomology in the A.A.E.E. was termed important by Dr. Rohwer who added that there are also other fields of interests "which do not yet have equal opportunity to unify their special segments of interest with the broader scope of the science of entomology." He called upon the entomologists to broaden their interests and to look upon the entomological field as a whole . . . not as an entomological segment. He concluded by saying that specialization will continue to be protected, but its limitations will be recognized.

Three concurrent sessions were held on the afternoon of Monday, first day of the meeting. These included the section of Plant Pest Control and Quarantine, under the chairmanship of C. R. Willey, Richmond, Va.; Section on Apicuture, under the chairmanship of E. J. Dyce, Ithaca, N. Y.; and the Section of Medical Entomology, with S. W. Simmons, Savannah, Ga., chairman. Two papers in the latter section dealt with a topic currently attracting considerable attention among insecticide manufacturers and users, particularly buyers of cattle sprays for dairy barn use,—the failure of residual deposits of DDT to give complete control of house flies. The speakers and their papers were W. V. King, Orlando, Fla., "Failure of DDT to Control Houseflies" and R. B. March and R. L. Metcalf, Riverside, Calif., "Observations on Housefly Control in Southern California in 1948." Because of space limitations, these papers are not reviewed here, but the reader is referred to an account of a similar

talk by Dr. E. F. Knipling before the National Association of Insecticide and Disinfectant Manufacturers (in news section, this issue) who covered the same subject and reviewed some of the same data.

A pair of motion pictures were shown later in the afternoon. These were "Fogging with the Bell Helicopter for Blackfly Control," and "Studies of the Tick Vector of Rocky Mountain Fever on Long Island." In the evening a joint symposium was held with the Biometric Society, with Dr. Frank Wilcoxon, American Cyanamid Co., Stamford, Conn., chairman. A panel of biometricians included C. I. Bliss, Connecticut Agri. Exper. Station, New Haven; A. E. Brandt, Atomic Energy Commission; Walter E. Jacob, Long Island Vegetable Research Farm; and John W. Tukey, Princeton University.

TUESDAY morning's session was a joint meeting with the Entomological Society of America in the Grand Ballroom. With Mr. Rohwer as chairman, the symposium discussed toxicity of insecticides to plants and animals other than man.

Dr. Frank P. Cullinan, assistant chief, Bureau of Plant Industry, Soils, and Agricultural Engineering, Washington, told the group that after four years of study, DDT and other insecticides which have remained in soil are still toxic. But the amount of toxicity varies with the type of soil, and the extent of phytotoxicity also varies with plant varieties of the same species. In his paper, "Insecticides—Their Effect on Plants and Soils," Dr. Cullinan emphasized that minimum dosages of insecticides should always be used. He pointed out that in the experiments conducted by the U.S.D.A., up to 20 times the normal amounts of insecticides were used in ordert o simulate the effect of several years' application. BHC displayed a tendency to injure roots more than other insecticides, and also made taste differences in fruit at some concentrations. DDT retards the growth of "sensitive" plants when it is present in the soil. It was noted in the experiments that DDT can persist in soil for a long period of time, but shows no phytotoxicity in acid soils. In low-acid soil, some injury was noted.

Dr. Cullinan stressed the fact that toxicity varies with different soil types. "This accounts for varied results in experiments," he pointed out, and added that much remains yet to be known about toxicity caused by disintegration of insecticide in the soil, and how much toxicity may be caused by impurities in the compound being tested. He said that one cannot state whether or not an insecticide is toxic to a family, such as tomatoes, because of marked differences in toxicity to varieties of tomatoes. BHC reacts on given varieties in a manner different from the reaction of DDT, he said, and chlordane and BHC have been noticed as being lethal to damping-off fungi in some cases. There are so many different reactions, that the whole matter is extremely complicated, Dr. Cullinan declared. All of the insecticides tested at Beltsville accumulated in the soil to a certain extent, he said. He said that DDT put in soil in experiments of 1945, was still toxic during the past season.

In closing, Dr. Cullinan reminded that although some injury may have been caused by various insecticides, yet the use of chemicals has brought about tremendous increases in crop yields. He emphasized that farmers and all users should know the limitations of the potent tools being placed in their hands, so that they may employ these tools wisely and safely.

DR. R. D. RADELEFF of the Kerville, Texas laboratory of the Bureau of Animal Industry, U.S.D.A., reported on investigations of the "Acute Toxicity of Chlorinated Insecticides Applied to Livestock," a paper of which R. C. Bushland, Bureau of Entomology and Plant Quarantine, U.S.D.A., was co-author. In a previous study, applications of six chlorinated insecticides had been checked to determine their acute toxicity for livestock. The insecticides were applied in emulsions or suspensions at a concentration of 1.5 per cent, eight times, at 4-day intervals. The insecticides were DDT, methoxychlor, TDE, chlordane, chlorinated camphene and benzene hexa-

**At New Yorker during AAEE meeting: 1st photo. L to R: Dr. Parr, Pennsylvania Salt Mfg. Co., Philadelphia; Dr. R. A. Fulton, U.S.D.A., Beltsville, Md.; Randall Latta, U.S.D.A.; and Dr. Floyd F. Smith, U.S.D.A., Beltsville, Md. 2nd photo: Dr. Al Boyce, new A.A.E.E. president with S. A. Rohwer, former president.**

chloride, used as sprays or dips on cattle, sheep, goats, pigs and horses. No poisoning was reported with any of the insecticides other than chlordane. Since the treatments were more severe than would ordinarily be used, it appeared that all products except possibly chlordane could be used for livestock pest control without causing acute effects to the animals.

In the spring of 1948 a chlorinated camphene emulsion concentrate became commercially available and was widely used in Texas. The spray treatments seemed to cause no injury, but the dipping resulted in several reports of fatalities among young calves. Studies at the Kerrville laboratory subsequently indicated that young calves are much more susceptible to poisoning by chlorinated camphene than are more mature cattle. Goats and sheep were less affected than calves, in the order noted. In spraying the chlorinated camphene, various formulations were of the same general final effect, but a xylene emulsion produced toxic symptoms most rapidly. Animals treated with suspensions of a wettable powder were the last to be affected, a kerosene emulsion concentrate being intermediate in its effect.

Chlordane was shown to be about as toxic as the chlorinated camphene for young calves. Calves were also shown to be highly susceptible to the gamma isomer of BHC, whether used in highly refined or technical form. In summary, this paper indicated that very little danger of acute toxicity need be anticipated through normal field use of DDT, methoxychlor or TDE. Chlordane, chlorinated camphene and BHC, on the other hand, are comparatively dangerous to use, particularly on young livestock. They must be used with extreme care, as any increase in concentration above safe levels, can prove to be dangerous. It should be kept in mind, incidentally, that these finding are based on studies of acute toxicity and do not take into consideration the danger from chronic effects, the author stated.

DR. CLARENCE COTTAM, assistant director, Fish and Wildlife Service of the Dept. of the Interior, reported the results of experiments with fish and wildlife and the new insecticides. He said that factors including formulation, size of treated areas, frequency and time of application can be so arranged that a minimum hazard to desirable animals is present. In the summer of 1947 while attempting to control the mountain pine beetle in Wyoming, DDT was sprayed by plane on three plots at the rate of 5 pounds per acre in two treatments with an 8-day interval. Although there was some mortality of birds, population reductions were hardly commensurate with what was expected from the dosages used.

At the same time, Dr. Cottam said, DDT in amounts of 5, 7½ and 10 pounds per acre was applied to plots near Sudance, Wyoming. Under these conditions where the plots were small and the birds were not confined to restricted areas, evidences of damage were "far less than had been anticipated," he declared. The speaker emphasized the importance of timing insecticidal applications to miss the birds' nesting season when adult birds remain near the nest.

The formulation of the insecticide has a considerable bearing on its effect on wildlife. For instance, the lethal dose of DDT in oil is a third to a fourth that of the dry compound. Follow-up studies of bird populations on projects utilizing DDT in oil solutions, dusts and wettable powder sprays have indicated that all will produce kills if used excessively. Applied with ground equipment, dust and wettable powder formulations at the rate of 4 pounds per acre have caused heavy mortality.

Differences in formulations have similar effects on fish, Dr. Cottam reported. When applied to water surface, DDT as an emulsion had the greatest effect. As a solution, it displayed a somewhat lesser effect, and was least potent as a suspension. In feeding tests, DDT was appreciably more toxic to fish when dissolved in oil than when given in fat-free carbohydrates or proteins.

In tests with benzene hexachloride, chlorinated camphene and DDD in addition to DDT, the insecticides were applied to the ground

**Below, 1st photo, L to R: R. S. Filmer, New Brunswick, N. J.; Harry L. Haynes, Carbide & Carbon Chemicals Co.; Melvin Goldberg, Pesticide Advisory Service, New York; and Joseph B. Moore, Mc Laughlin Gormley King Co., Minneapolis. 2nd Photo: (standing) C. Y. Haas, Attapulgus Clay Co., Philadelphia; Arthur Bixby, Pennsylvania Salt Co., Philadelphia; Douglas Malcolm, Geigy Co., Inc., New York. Seated, Dr. Frank Maughan, Rohm & Haas, Philadelphia; and Dr. Al. Boyce.**

and foliage in brooder coops at the rate of 5 pounds per acre. Ten male and ten female quail were put in the pens, and after 10 days of eating the treated foliage, no ill effects were observed. In a subsequent test, similar groups of quail were placed on diets of 0.025 per cent of one or another of these toxicants: BHC, DDT, chlorinated camphene and DDD. On the 8th day the DDT-fed group showed extreme excitability, and three of the birds died on the 11th day. On the 14th day, two birds on the DDD diet died. At the end of 44 days, the mortality was as follows: DDT, three deaths; DDD, two deaths; benzene hexachloride, one death. One bird on the chlorinated camphene diet died, but its death was not definitely caused by the insecticide.

On fish, the newer insecticides had varied effects. Chlorinated camphene was more toxic than DDT to minnows and other species. In outdoor ponds an application of 0.125 pound per acre (0.02 p.p.m.) made 100 per cent kills. Some young rainbow and brown trout were killed at concentrations as low as 0.005 p.p.m.

BHC isomers have a varying effect on fish. The gamma isomer gave a 100 percent kill of brown and rainbow trout at 0.05 p.p.m. The beta isomer showed no effect at 10 times this concentration, and the delta isomer showed toxic symptoms, but the fish recovered.

Chlordane at 1 pound per acre produced an 87 per cent kill of bluegill sunfish, but this species survived a 0.5 lb. per acre treatment. Parathion killed these fish at levels above 0.04 p.p.m. DDD was not much different than DDT in toxicity to fish. Methoxychlor permitted fish survival only at concentrations of 0.15 p.p.m. Preliminary tests placed this compound in the same general toxicity class of DDT.

### Toxic Limits Not Set

CHARLES W. CRAWFORD, Associate Commissioner, Food & Drug Administration, emphasized once more in his talk, "Insecticides and The Food Law," the great responsibility which manufacturers and users of agricultural insecticides face in making sure that the national food supply will not be contaminated, nor the national health endangered, by the application of hazardous insecticidal products to foodstuffs. Too many products presenting toxicity problems have been rushed into manufacture and use, he warned, before being thoroughly tested. Every phase of the toxicity problem must be thoroughly investigated, he counseled, even though necessary research is expensive and time consuming, before new insecticides are offered for use.

He quoted briefly from the Food, Drug & Cosmetic Act, emphasizing that presence of even small insecticidal residues in foodstuffs cannot be permitted unless use of such insecticides is "required" in the production of these foodstuffs. Fairly liberal tolerances may be permitted, he indicated, where the specific crops cannot be produced without use of the particular insecticide, but where there are means available for the production of such crops without use of hazardous insecticides, the F.D.A. is within its rights, he feels, in setting very low tolerances or perhaps even prohibiting use of hazardous insecticides completely.

In answer to a question from Dr. Rohwer as to what tolerances may be safe for various insecticides and on various food crops, Dr. Crawford indicated that it is too early as yet for the F.D.A. to fix definite limits. Some time ago a tolerance was set of 7 parts of DDT per million on apples and pears,—a rough estimate based at the time it was made on earlier experience with other toxic insecticides. This figure may be too high, he indicated, as liver damage has been shown to result at levels lower than seven parts per million.

UNDER the chairmanship of C. S. Harris, Shell Oil Co., New York, a session on Insecticides was held on Tuesday afternoon. A number of new insecticidal materials were introduced by representatives of the makers. Julius Hyman & Co., Denver, presented reports on insect toxicant compounds "497" and "118". The former was described as an odorless white crystalline solid which may be formulated as sprays or dusts, and has shown promise in control of flies, roaches, grasshoppers, confused flour beetles and red spider mites. Compound "118" was reported to equal or exceed the insecticidal activity of the gamma isomer of BHC, and has residual properties comparable to chlordane. It may be formulated as dusts or sprays, and has shown promise against a list of insect pests including grasshopper and plum curculio. Compared to chlordane, it appears to be slower in its action.

Carbide and Carbon Chemicals Corp., New York, introduced two fly repellent materials, "Crag Repellent No. 1" and "Crag Repellent No. 2." The materials were described as being non-toxic to animals, easily formulated, and will repel stable flies from 1 to 7 days. The No. 1 compound is a synergist for pyrethrum.

U. S. Industrial Chemicals discussed two butoxypolypropylene glycol compounds as fly repellents for livestock. Tests on both cows and horses indicated promising repellency for the compound. It has also been observed that the compounds act as pyrethrum synergists, and have low toxicity to mammals. They may be formulated in either oil or water.

### Formulations Studied

FORMULATIONS were discussed by six individuals under the chairmanship of A. M. Boyce and the leadership of Dr. G. E. Carman, Riverside, Calif. at the Wednesday morning session. Dr. R. A. Fulton, U.S.D.A., Beltsville, Md., covered the subject of liquified gas aerosols. He stressed the importance of compatibility in aerosol formulations, particularly for low pressure use. He told of experiments in greenhouses with parathion and hexaethyl tetraphosphate, and discussed briefly I.C.C. rules covering shipment of aerosols. Low pressure containers may now be shipped, under new regulations.

Emulsions were discussed by Dr. Kenneth Karsten, R. T. Vanderbilt Co., New York. He pointed out the necessity of knowing all possible about solvents being used. Even the same solvent from the same manufacturer may vary from time to time,

he said, and this should be taken into consideration. Even water used should be specified whether hard or soft. The temperature at which formulations are made is also of importance. The product must perform both physically and biologically to accomplish its end . . . to kill insects.

Dr. G. A. Ferguson, Geigy Co., New York, talked on dilute suspensions. After pointing out the half-dozen or more variable factors involved in such formulations, each factor having an effect on all the others, he stated that formulation becomes more of an art than a science. The particle size is important, he said, because the performance of an insecticide depends upon it. If too large, distribution is impaired; if too small, the residual effect is reduced. Problems of storage are severe, he said. Changes of particle size can cause caking in a finished product.

Concentrated suspensions were the subjects of a paper by D. J. L. Brann, Cornell University. He told of work on fruit and in the field, and of use of wettable powders at rates of from 2 to 5 pounds per 100 gallons. Emphasis was placed on the material being wet, not dry, upon reaching the plant foliage. Otherwise, poor results will obtain. Although solutions are much easier to handle, and resist weathering, they are more toxic to trees. He showed slides picturing deposits on leaves taken from the top, sides and lower branches of treated trees, indicating the need for more efficient equipment for application.

Randall Latta, U.S. Dept. of Agriculture, told the group that particle size should be measured at the place where it lands on the plant . . . not at point of generation. His paper on "Concentrated Solutions" stated that particle size has a particular bearing on the phytotoxicity of a concentration. The smaller the partice size, the less its hazard, he said. He urged that particle size be held down, and added that much further study is needed on the subject. The solvent used in solutions for "mist-blowers" and similar equipment has an effect on the machinery and the safety of the persons operating it.

J. P. McKenna, Vahlsing Insecticide & Chemical Corp., Robbinsville, N. J., told the group that the formulation of dusts has failed in many instances, to keep pace with the development of application methods. He called for more detailed study of the physical and chemical characteristics of the diluents used in blending dusts. Although lighter type diluents were formerly chosen for their flowability and bulk in old-type machines, they frequently drifted upward, resulting in poor coverage and erratic control. The introduction of turbo type dusters and better techniques in aerial application has made possible the use of heavier diluents which are not affected to as great a degree by atmospheric conditions. Control of drift is also approached by use of impregnated dusts, he said.

Wednesday afternoon's program was divided into three concurrent sessions. One on teaching entomology, was under the chairmanship of H. O. Deay, Lafayette, Ind. The other two were paper reading sessions, one of which featured a moving picture on control of the red-banded leaf roller, by Dr. Charles E. Palm, Cornell University. The annual entomological banquet was held on Wednesday evening. The scheduled speaker, Harlow B. Mills, chief, Illinois Natural History Survey, Urbana, Ill., was unable to appear because bad weather had grounded his plane, and a color movie travelogue of Central America was shown instead. This film, taken by Dr. John B. Creighton, University of Florida, was described by him during the showing.

THE final business session was held Thursday morning, last day of the meeting. Following this, invitation papers from industry associations were presented. William O. Buettner, secretary of the National Pest Control Association stated that users of pest control chemicals have a responsibility to the public, the Government and educational institutions, and to the industry itself. He traced the history of pest control from the relatively haphazard methods of a few years back, to the intergrated program of research and modern methods which characterize the work of today. He said that the entomologist must have a sound knowledge of economics in addition to his scientific learning, to perform his best service.

Dr. H. W. Hamilton, secretary of the National Association of Insecticide and Disinfectant Manufacturers, New York, suggested to the assembly that the word "poison" on most insecticides is "terrifying" and unnecessary for insecticides as a general group. He suggested the consideration of "Pesticides" to replace "economic poisons." Expressing himself on complete formula disclosure on labels, the NAIDM secretary said that this practice is "as archaic as laws dealing with horse thieves on the island of Manhattan." Other problems facing the industry deal with common names and terminology not only of complex chemical compounds, but of spreaders and diluents as well.

L. S. Hitchner, executive secretary of the Agricultural Insecticide & Fungicide Association" (soon to be known as "National Agricultural Chemicals Association") pointed out that the insecticide industry is governed by no less than 496 laws which affect labeling, directions for use, guaranteed analysis, precautions, etc. The industry faces a period of criticism, he warned, stating that sections of the food industry, the medical profession and others have already blasted the use of certain pesticides. Mr. Hitchner said that not all pest control materials constitute a hazard, and if labels were followed carefully, the trouble would be greatly minimized. He told of the interest of the AIFA (NACA) in reaching all groups who use pesticides, and announced the association's new policy of including custom operators, dealers, and suppliers in its membership.

Paul S. Willis, president of the Grocery Manufacturers of America, Inc., New York, discussed "The New Pesticides—A Responsibility of Free Enterprise." He pointed out that experience with use of certain new insecticides has alerted the food industry and associated groups so that numerous committees have been formed to discuss the problems and to

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## *Nomenclature, New Products Studied as APS Discusses*

# FUNGICIDES

THE American Phytopathological Society named Dr. W. D. Valleau, Lexington, Ky., as its president during the group's fortieth annual meeting, December 6-8, at the William Penn Hotel, Pittsburgh, Pa. Dr. Valleau succeeds Dr. R. S. Kirby, State College, Pa. The new vice-president, succeeding Dr. Valleau, is Dr. C. M. Tucker, U. of Missouri, Columbia. Dr. W. D. Tisdale, E. I. duPont De Nemours & Co., was elected a councilor of the Society, and Dr. Curtis May, U.S.D.A., Beltsville, Md., remains as secretary. Dr. M. C. Richards, treasurer, likewise continues at his post with the Society.

Various sections of the meeting covered diseases of fruits, vegetables, field crops, grains and forest trees; and in the final afternoon, a fungicide colloquium was held in which representatives of manufacturers of fungicides and makers of diluents and adjuvants presented to the group a number of new products, some of which are to be marketed during the 1949 season.

In the opening program, "Diseases of Peach and of Apple," Dr. D. H. Palmiter, Geneva, N. Y., told his hearers that the continuous use of "Fermate" fungicide on McIntosh apple trees (which had received no nitrogen fertilizer during a period of six years) increased the yield of fruit 57 percent over the yield of corresponding trees which had been sprayed with wettable sulfur. Annual soil applications of two or more pounds of N per tree increased the yield of sulfur-sprayed trees over that of the unfertilized "Fermate" plots during the first two years of the test, but during the subsequent three years, the "Fermate"-treated trees out-yielded even the best nitrogen-fertilized plots.

The group attending a concurrent session on tomato diseases heard a paper by J. D. Wilson and H. A. Runnels, Wooster, Ohio, describing Tomato Anthracnose Control in 1948. Application of "Zerlate" ranked near the top in comparative tests with some 30 fungicides for control of anthracnose, the paper said. The experiment indicated that from the standpoint of timing, beginning on July 10 or 20 was most effective. Sixty-day programs were begun on June 10 at ten-day intervals to August 19, and from these tests the best timing was noted. A test of eradicant sprays applied to the soil just before the plants fell over, indicated that at least two of the materials tested may give some control of later fruit infection. The addition of various stickers, etc., to "Zerlate" showed little increase in control over the 2-100 formulation, the paper said.

In the same session, a paper by G. L. Mack and W. T. Schroeder of the New York State Agricultural Experiment Station, discussed the use of various spray adjuvants to improve the sticking and distribution pattern of zinc dimethyldithiocarbamate on tomato foliage. The results were obtained by correlating disease control data with the evaluation of the fungicide deposits as determined by the chemical leaf print method, the authors explained. Seven commercially-prepared stickers were applied with "Zerlate" in the test. Prints were made from leaves immediately after spraying and again after weathering. A correlation existed between leaf deposit ratings and control of Alternaria defoliation, with one exception, it was stated. The product "B-1956" controlled disease better than would have been predicted from the leaf prints. "Orthol K," "Orthol D" and "Veg-Oil" were reported to be outstanding from the standpoint of deposit ratings and control of Alternaria defoliation.

A symposium on the teaching of plant pathology was held Monday evening, with Dr. George F. Weber as chairman. Speakers included F. D. Kern, Pennsylvania State College, State College, Pa.; J. G. Leach, U. of West Virginia, Morgantown; S. G. Lehman, N. Carolina State College, Raleigh; L. D. Leach, U. of California, Davis; and G. L. McNew, Iowa State College, Ames.

Three concurrent sessions opened the activity on Tuesday morning. These covered a session on Fungicides, under the chairmanship of Dr. J. W. Heuberger, University of Delaware, Newark, Del.; another session on diseases of vegetable crops including cucumbers, beans, onions and others, with W. J. Zaumeyer, chairman; and "Diseases of Field Crops," under the chairmanship of K. W. Kreitlow.

The session on fungicides took up problems of application and re-

**Former APS president, Dr. R. S. Kirby, State College, Pa., (left) hands new gavel to his successor, Dr. W. D. Valleau, Lexington, Ky., while the newly-elected vice-president, Dr. C. M. Tucker, Columbia, Mo., looks on.**

ported results with a number of compounds during the past season. A paper by J. B. Rowell and F. L. Howard, Rhode Island Agricultural Experiment Station, Kingston, reported studies of "mist blower" fungicidal concentrates for row crops. Application at rates of 3-5 gallons per acre by low volume applicators was studied, the paper said, and it was discovered that fine particle size and a wide distribution pattern are necessary for coverage and avoidance of plant injury. A Potts-Spencer airblast machine attached to a tractor was used in the past season's tests. An adjustable 4-row boom was equipped with 4 fish-tail air nozzles in front of which were mounted 4 liquid nozzles which sprayed the concentrate into the air stream. The droplets varied considerably in size; the larger ones of the oil-fungicide solutions causing severe injury to the foliage. Otherwise, injury was eliminated by emulsifying the fungicide-oil solution in water. Two copper products, "Procop 110" and "Puratized 111-5," controlled late blight of potatoes satisfactorily, as compared to the checks.

M. C. Richards and Douglas Murphy, New Hampshire Agricultural Experiment Station described their experiments in use of a vacuum duster in the screening of fungicidal materials, in much the same manner as such equipment has been used in the insecticidal field. It was found to give a uniform distribution of rust inoculum and fungicide to both the upper and lower surfaces of bean leaves. By observing the number and distribution of the rust lesions, it was possible to determine differences in the nature of the diluents with respect to ease of mixing and uniformity of the mixtures, the paper stated.

Control of fruit tree disease with a new type of spray-duster and mist sprayer was described in a paper by Robert M. Pratt, L. M. Massey and K. G. Parker, Cornell University. The device applies either wetted dusts or mist spray formulations. Air delivery for the machine under test is approximately 20,000 cu. ft. per minute at 105 miles per hour. Mechanical means are provided to adjust the angle of the air streams to compensate for wind interference. Control of apple scab, cherry leaf-spot and peach leaf curl has been equal to or superior to that obtained by conventional methods. Sulfur, lime sulfur, dinitro ortho cresol, insecticides and adjuvants have been applied. Experiments on the control of fruit insects have been made in cooperation with entomologists, the authors reported. Both the spray-dust and mist methods are effective, but the latter is more economical in materials used, and is less complicated mechanically. Disease control and chemical deposit data indicate that adequate coverage is obtained with this machine.

L. D. Leach, University of California, Davis, told the group that spray applications of fungicides on seeds, when given uniform coverage, will afford protection equal to or superior to that from dust treatments. Soluble fungicides are more satisfactory for spray application because they eliminate the problem of maintaining suspensions and reduce the possibility of nozzle clogging. As an example, the paper cited experiments with beet seed where an 0.1% per cent solution of ethyl mercury phosphate applied at 4 per cent of the seed weight was as effective against Pythium damping off as "Ceresan M" or "Phygon" at their usual dosages. It was pointed out that the maximum moisture application without drying depends upon the absorptive power of the seed surface. Four per cent is satisfactory on beet seed, but not more than 0.5 per cent should be used on lima beans.

As did the program of the morning, Tuesday afternoon's schedule called for three concurrent sessions also. These were: "Results of Regional Testing of Sprays and Dusts," under the chairmanship of Dr. J. D. Wilson, Wooster, Ohio; Diseases of Grape, Cherry and Other Fruit Crops," with George A. Zentmyer, chairman; and "Diseases of Tobacco and Miscellaneous Crops," with E. E. Clayton, chairman.

In the reports on sprays and dusts, Dr. J. W. Heuberger, University of Delaware, related results of the national cucurbit fungicide tests conducted in 1948. The season on the whole was a year of light disease attack on cucurbits. Downy mildew disease, for example, was of little consequence except on cucumbers in S. Carolina and Delaware. It was emphasized that although the data were not significant, the zinc fungicides gave better control of anthracnose than did the copper fungicides. Zinc dithiocarbamates were also effective in control of downy mildew, "Dithane Z-78" and "Parzate," containing the same toxicant (zinc ethylene bis-dithiocarbamate) reacted differently. The former was non-injurious and gave better disease control than "Parzate." "Zerlate" gave consistent results; "Tribasic" also gave good results, except when applied too frequently, the report said. Of all the materials tested in 1948, Dr. Heuberger reported, "Dithane Z-78" was best from the standpoints of disease control, lack of plant injury, and yield. Of most significance, the report concludes, was the fact that the zinc dithiocarbamate fungicides did not increase yield in the absence of disease on the plants.

M. B. Linn, University of Illinois, Urbana, presented a summary of the 1948 cooperative tomato fungicide experiments. Fifteen states took part in the tests, including Delaware, Illinois, Iowa, Maine, Maryland, Michigan, Minnesota, N. Jersey, New York, N. Carolina N. Dakota, Ohio, Pennsylvania, S. Carolina and Tennessee.

The results were tabulated under the heads of sprays and dusts. Of the former, "Dithane Z-78" was reported to be "somewhat superior" to other treatments, with regard to yields and control of defoliation. However, in 8 of the 13 tests in which both "Parzate" and "Z-78" appeared, "Parzate" plots yielded more than the others. Each material was considered somewhat better than other treatments from the standpoint of yield. In the control of defoliation due principally to early blight, there was little difference among "Z-78" "Parzate," "Tribasic" and Bordeaux, the summary stated. In control of anthracnose, "Zerlate" showed more promise than "Z-78" or "Parzate," although all were effective.

In dusts, "Tribasic" appeared superior to all other fungicides and combinations, particularly in states where late blight and *Cladosporium* leaf mold were factors in reducing yields. The organic zinc dusts used in these tests did not seem adequate for the control of these two diseases, it was reported.

The annual Phytopath banquet was held on Tuesday evening at the hotel, followed by musical entertainment by the Westinghouse quartet. President Kirby announced the selection of Dr. Valleau as the new president and C. M. Tucker as vice-president. A new gavel was presented to the president by Dr. Leach of West Virginia University, Morgantown.

### Colloquium Final Day

FINAL event of the meeting, was the fungicide colloquium, under the chairmanship of Dr. Howard. Common names for fungicides were discussed by Dr. Dwight F. Powell, Urbana, Illinois, who pointed out some of the problems being faced by the committee on nomenclature. Many of the policies involved have yet to be defined, he said, and added that writers, speakers, and publications dealing with the new organics have difficulty in describing fully the materials being discussed. Dr. S. A. Rohwer, member of the committee working on names, was quoted by Dr. Powell as having stated that progress is being made, although most of the names have not as yet reached an official status. Materials in the experimental stage should not carry common names, it was pointed out, and such names are applied only to compounds; not formulations.

Recent developments and progress in new fungicides were discussed by M. C. Goldsworthy, U.S.D.A., Beltsville. He traced the history of fungicides, pointing out how use of bordeaux and lime sulfur was standard practice until the 20's when demand for graded fruit led to a re-study of non-corrosive substitutes which would serve to eliminate injuries from copper, and reported its success. Studies were made with many insoluble copper compounds, and this pioneering led to their adoption, he said. His talk brought the subject up to date, with the latest fungicidal materials.

L. S. Hitchner, executive secretary of the Agricultural Insecticide and Fungicide Association (soon to become "National Agricultural Chemicals Association") reviewed many of the problems facing manufacturers of fungicides and insecticides, pointing out that the new materials bring new problems which must be solved through the cooperation of all segments of the industry. He reminded that users must be taught to read and obey the labels on insecticide and fungicide containers, and to apply materials exactly as the makers intended.

Industry and Experiment Station cooperation was discussed by M. D. Farrar, Crop Protection Institute, Durham, N. Hampshire. Many of the programs carried out by agricultural experiment stations are actually of industrial nature, he said, because much of it is not fundamental research. The scope and function of the experiment station is to provide new ideas for the benefit of agriculture. Tools for research are needed and are much in demand by experiment stations, he said.

Industry's number one problem is to find out what chemicals are useful, Mr. Farrar declared. He pointed out that a single chemical compound has been known to cost its manufacturer as much as $100,000 through research, piloting, and placing it on the market. There are hundreds of new chemicals which appear to be promising for various functions, but all must first be screened and tested. It is industry's place to test its own products, Mr. Farrar said. The experiment station should not screen untested chemicals, except where the station can do this under an industrial fellowship.

Dr. L. Gordon Utter, Phelps Dodge Refining Corp., New York, pointed out some of the mutual problems faced by the entomological group and the plant pathologists, and sug-

gested in his talk that the two groups make plans to hold joint meetings as soon in the future as such may be arranged. He reviewed a number of problems faced by each group, and called attention to the increasing tendency toward combining fungicides and insecticides in farm use. This brings up problems of compatibility between the respective products, and not only that, the compatibility of various diluents, and adjuvants. Synergism of different combinations must be studied, he said, as well as the toxicology of both insecticides and fungicides apart and in combinations. Residue problems are of common interest, he declared, and the control of insect vectors of virus diseases is a problem calling for the combined skills of each group.

Need for a clearing house for information regarding both plant disease and insect infestations was pointed out by Dr. Utter. With such a setup, he said, recommendations to growers could be direct and easily understood, with a minimum of confusion and contradictions. The advancement of new application equipment has focused attention on need for joint studies in this field. Each group faces the problem of cooperative effort in experiment stations. In conclusion, Dr. Utter stated that joint meetings would effect sizeable economies for those who regularly attend both gatherings, and usually have to travel extra distances and spend extra time to do so.

In the final portion of the meeting, manufacturers of fungicides, diluents and adjuvants introduced to the group new products to be offered on the 1949 market; to be available for experimental work during the year; or which had been improved since last season. California Spray-Chemical Corp. announced "Tag Fungicide No. 331," to be available through the company's district offices and its distributors. The new material has been tested against apple scab with promising results, and promise is also seen in control of turf diseases, stem-end rot in citrus and as a seed protectant. The formulation is completely water-soluble and may be added to the spray tank at any time, the announcement said.

California Spray-Chemical Corp., also presented fungicide RE-358, (dimetacresyl trichloroethane) which is being tested for control of damping off of seedling plants, and against pear scab. At present, the material is being tested for fruit washing to prevent storage mold on pears and apples. The fungicide is said to be non-poisonous, and as such leaves no toxic residue. The company reported that test work on the product is being continued with the hope of developing it into commercial sales later. Samples are available for test work, it was stated.

Rohm & Haas Co., Philadelphia, discussed two products, "Dithane D-14" and "Dithane D-78"; water soluble liquid and dry powder, respectively. The former (disodium ethylene bisdithiocarbamate), is said to have been used successfully on a commercial scale for control of late blight and early blight of tomatoes and potatoes, celery blights, downy mildew of cucurbits, and other diseases. During the past season it was said to have controlled anthracnose on tomatoes.

"Dithane Z-78" (zinc ethylene bisdithiocarbamate) is effective on the above diseases when used at concentrations of 1½ to 2 pounds per 100 gallons of water, the company stated. The "Z-78" was developed especially for dust formulations.

Rohm & Haas also introduced "Arathane" (dinitro capryl phenyl crotonate), which is for use as a miticide, fungicide and insecticide on fruit, vegetables and ornamentals. The material is expected to be compatible with most commonly-used insecticides and fungicides. Oils, however, are likely to increase the phytotoxicity of the product, it was pointed out. "Arathane WP-25" (wettable powder) will be available in 1949 for experiment station testing. "Arathane" 25% Emulsion Concentrate will be available only in limited quantities for small scale trial.

Three products were presented by Carbide and Carbon Chemicals Corp., New York. These were experimental fungicides 224 and 640; Crag Potato Fungicide 658; and Crag Fungicides 341B and 341C. Numbers 224 and 640 are seed treatment materials for control of seed decay and pre-emergence damping-off. They are available in research quantities.

"Crag" potato fungicide 658 is the result of six years' research to control early and late blights of potatoes. The material also shows promise for control of diseases on melons, grapes, celery, citrus and ornamentals. The material is compatible with DDT, and is commercially available for use as a potato spray fungicide or for the compounding of a fungicidal dust.

"Crag" fruit fungicides 341B and 341C are for control of apple scab and cherry leaf spot. They are of interest for experimental work with all plant diseases except those affecting tomatoes, potatoes and melons on which the materials are phytotoxic. Both fungicides are availavle in commercial quantities.

Gallowhur Chemical Corp., New York, presented "Puratized 111-S," an experimental fungicide for mist-blower application. It is a mercury-copper quaternary ammonium complex. During the 1949 season experimental quantities will be available to research workers upon request, the company stated.

Gallowhur's second offering was "Puratized Apply Spray," an aqueous formulation containing 5.6 percent phenyl mercury monoethanol ammonium acetate. It has been used as an eradicant and protectant against apple scab in tests during the 1948 season. The product will be commercially available in 1949 in the 17 areas where it was proved to be effective in previous tests.

"Puraturf GG" was the final Gallowhur product introduced. It is a mercury-cadmium quaternary ammonium complex which has shown promise against dollar spot during 1948. Results were incomplete, the company said. Experimental samples are available for further field trials.

**Numerous new fungicidal materials now ready for testing; some already placed on market**

## A Discussion of the

# Fertilizer Situation*

CURRENT trends in national affairs seem to point towards a continuance of policies which have been followed by the Federal Government more or less closely for the past sixteen years. Many of these trends are not favorable to business in general, and some seem to be particularly threatening to the fertilizer industry. With the possibility of the re-imposition of production controls, allocation of certain materials, price controls, excess profits taxes, etc., looms the possibility of legislation which would put the Government further into the business of producing and distributing fertilizer materials in competition with private enterprise.

Since eternal vigilance is the price of liberty, it behooves every member of the fertilizer industry to be on the alert in matters that will affect his business. Each one should continue his efforts to advise his Senator and Congressman to deal with these matters in a long-view, constructive way.

The fertilizer materials situation has both bright spots and dark ones. Between 185 and 190 superphosphate plants are now in operation as compared with 156 plants reported by the U. S. Department of Agriculture in 1942. In spite of curtailed production in some plants due to inability to obtain nitrogen solutions, it is now estimated that the production of superphosphate for this year will be nearly 11,000,000 tons, an increase of about 6% over last year.

Potash production also is estimated to be somewhat greater than last year, deliveries so far this year reaching a new peak, approximately 9 percent above last year.

The most difficult aspect of the fertilizer materials situation in the immediate present relates to nitrogen. At the beginning of the current fertilizer year, the U. S. Department of Agriculture estimated that 902,000 short tons of fertilizer nitrogen in all forms of material would be available to American farmers during this year, referring to this amount as being about 10 percent greater than the preceding year's use of 817,000 tons.

**To avoid confusion, it should be kept in mind that the author refers to the 1947-48 fertilizer season when he speaks of "this year's" supply, or consumption. The paper was presented in 1948.**

It now appears from more recent production reports that last year's consumption reached approximately 850,000 tons and that the estimate of agricultural nitrogen available for the current year has been increased to about 925,000 tons. On the basis of these figures this year's total nitrogen supply would seem to be about 8 percent greater than last year's, rather than 10 percent greater. These are over-all figures, and even if the estimate for this year should be realized, it does not follow that all sections of the country will get an increase. In fact it seems now that certain areas, particularly the Southeast and New England, will get even less nitrogen than they had last year.

It should be borne in mind also that it is quite possible that the estimated production for the current year will not be realized. At least three factors have already, during the first four months of the year, curtailed nitrogen production, namely; strikes, conversion of facilities to production of methanol, and plant breakdowns. Maritime strikes have hindered the normal flow of materials. Cargoes of nitrogen-bearing materials could not be unloaded and nitrate ships were not permitted to sail from Chile to Pacific Coast ports pending settlement of these strikes. It would not be surprising if this year's supply should be only slightly in excess of last year's—probably not more than 2 percent or 3 percent.

Increased production of nitrogen in 1949 seems to be assured through enlargements, already announced, of existing plants. Entirely new plants are also in prospect.

However, one potentially adverse factor in the 1949 outlook deserves special notice. We have heard, from sources which have heretofore proved to be reliable, that the Army is planning to increase its shipments of nitrogen to U. S.-occupied areas in 1949.** This projected increase is of such magnitude that to bring it about would not only require all the nitrogen that the Ordnance plants can make, plus the entire output of one plant whose production is subject to Army option, but would also necessitate the commandeering of a substantial tonnage of our commercial production. This, of course, would result in a reduction of the nitrogen available to American farmers.

Every member of the fertilizer industry knows how pitifully inadequate is the present supply of domestic nitrogen. It is unthinkable that this supply should be further curtailed in order to increase shipments to occupied countries whose ability to take care of their own needs,

*Presented at the 22nd Fall Meeting of The National Fertilizer Association, November 16, 1948, at the Atlanta Hotel, Atlanta, Georgia.

** The Department of the Army has since stated that its plans "do not include any purchases whatsoever of Nitrogen fertilizer from commercial sources in the United States . . ."

by

Ray King

Valdosta Fertilizer Co.,
Chairman NFA Board of Directors

we have been told, would increase as the war years receded, which should consequently result in a progressive decrease in the tonnage of nitrogen to be shipped to those countries.

It is imperative that every member of the fertilizer industry should immediately get in touch with his respective Senator and Congressman and advise them of this potential action. The lawmakers may then be alert to protect the interests of the American farmers by insisting that the nitrogen shipped to U. S.-occupied countries not be increased above the tonnage shipped during each of the preceding two years. On the contrary these shipments should be *decreased*.

### Manufacturing Problems

THE manufacturing problems of the industry have been greatly complicated during the last few months by the nitrogen situation. In many instances superphosphate could not be moved because sufficient nitrogen solutions could not be obtained to enable mixed goods or bases to be laid down. It is reported that a number of superphosphate plants were forced to reduce their rate of production, and others even to close down, for this reason. Substitute forms of nitrogen even if obtainable would result in goods of less satisfactory mechanical condition. Superphosphate tonnage so lost can seldom be regained later by more intensive operation. In very few instances have manufacturers been able to obtain sufficient quantities of the forms of nitrogen most suitable to their needs. The use of substitute forms presents difficulties in both manufacturing and formulation.

Not only has the tonnage of our industry's products increased year by year during the last 10 years, but there has also been an increase in the average plant-food content. There is room for additional increase. Until the average plant-food content of fertilizer production is as high as is economically and agronomically sound, considering the supply and cost of the raw materials available, efforts should continue to be made to attain that goal. Progress in the production of fertilizer distributing machines permits the more accurate placement of specified quantities of fertilizer and reduces the danger of the use of concentrated mixtures. Increasing freight rates make the unit transportation cost more and more vital. Increased knowledge of the consumer as to the proper use of fertilizer has tended to reduce the usual resistance to more expensive goods. For these and other valid reasons, the industry should make every effort to have higher analysis goods used in the interest of furnishing the farmer his plant food at the lowest possible cost in view of the materials available for use.

On July 27, 1948, the temporary increases in freight rates in effect under Ex Parte 166 were made permanent by an order of the Interstate Commerce Commission. Maximum increases were placed on fertilizers and fertilizer materials and on phosphate rock. Further petitions by the industry requesting a reduction in these ceilings resulted in a reduction of one cent a hundred pounds on the phosphate rock rate, but no reduction on the other items. The rail carriers have now filed a new request for a 13 percent increase in rates on practically all commodities including fertilizers, fertilizer materials, phosphate rock and sulfur, with no provisions for any ceilings. Such a further increase would on the average probably increase the cost of a ton of fertilizer delivered to the farm from 75 cents to a dollar over and above the several dollars a ton due to recent increases already granted. Such further increases on our products will of course be protested. The rail carriers already collect multiple rates on fertilizers in the shape of incoming charges on raw materials and outgoing charges on finished goods. In addition, a ton of fertilizer produces greatly increased potential tonnage for the carriers in the form of extra crops and other farm products marketed, which are the direct response to the use of fertilizers.

### Radioactivity

ALL members of the fertilizer industry are keenly interested in the studies now being made by the U. S. Department of Agriculture, in cooperation with a number of State experiment stations, with respect to radioactivity. For about two years experiments, originally sponsored and financed by fertilizer manufacturers, have been under way in which radioactive phosphorus has been used as a tool to trace the behavior of phosphorus in the soil, in fertilizers, and in plants. This year a series of experiments was inaugurated to study the effects on plant productivity of radioactive materials placed in the soil. It is expected that reports on both these studies will be made public in the near future.

Certain economic factors may affect the future consumption, however. It is a fact that under normal conditions, farm income is the most important factor in determining the amount of fertilizer that will be used. Normally fertilizer consumption follows farm income up and down.

Factors affecting farm income include, of course, the USDA price support program. The emergency program was to expire on December 31, 1948, but, under the Agricultural Act of 1948, would be succeeded immediately by a temporary program for 1949, and then by a permanent program for subsequent years. The significant thing is that the Congress has again gone on record and has established price support for farm products as a permanent part of the agricultural economy.

Another important factor in the crop production picture, and hence in the fertilizer consumption picture, is the extraordinary demand for farm products during the past few years. Again there is uncertainty, but it would seem safe to assume that until war-devastated countries again become self-supporting so far as their

(*Turn to Page* 76)

# New Chemicals Introduced as WEED KILLERS at North Central Conference

DISCUSSIONS covering state legislation, a proposed model state bill, reports on tests conducted during the past season and recommendations for 1949 were featured at the 5th annual meeting of the North Central Weed Control Conference at the Abraham Lincoln Hotel, Springfield, Ill., December 8-10. The group elected as its president for 1949, Dr. R. S. Dunham, University of Minnesota, St. Paul. Dr. Dunham succeeds Dr. C. J. Willard, Ohio State University, Columbus. Other officers elected at the meeting included Dr. Glen Vichmeyer, University of Nebraska Experiment Station, North Platte, Nebr., vice-president, to succeed Dr. W. W. Worzella, South Dakota State College, Brookings, S. D.; and Dr. E. A. Helgeson, North Dakota State College, Fargo, N. D., secretary-treasurer, to succeed Dr. Dunham who became president of the conference.

Committee meetings occupied the afternoon and evening of Tuesday, the day preceding the meeting proper. Dr. Willard opened the meeting on Wednesday. Dr. L. M. Stahler, U.S.D.A., Brookings, S. D., told of the coordinated research program of 1948, reporting the progress made over the past season. Reports of pre-emergence treatments on corn and other field crops were presented by R. F. Fulleman, University of Illinois, Urbana and K. P. Buchholtz, University of Wisconsin, Madison.

Three concurrent sessions were held in the afternoon. These included one on "Field Crops," under the chairmanship of J. J. Greaney, Winnipeg, Canada; "Horticultural Crops," with B. H. Grigsby, Michigan State College, Chairman; and "Non-Tillable Land," with L. W. Melander, U.S.D.A., Minneapolis, Minn., chairman.

Keith C. Barrons, Dow Chemical Co., Midland, Mich., discussed the use of phenolic compounds for residual pre-emergence treatments of horticultural crops. Residual doses of "PCP" and "DNOSBP" were tolerated in effective residual dosages by a number of large-seeded plants, Mr. Barrons reported. These plants, including corn, peas, various beans, cucurbits and sunflower withstood the action of the materials while small-seeded weeds were controlled when surface moisture was present. Promising results were obtained with established asparagus treated before first emergence and after discing, following final cutting, the paper said. Emulsifiable formulations of the parent phenols and water solutions of their salts proved successful. From 15 to 20 pounds of "PCP" or its sodium salt, or 5-8 pounds of "DNOSBP" or its ammonium salt per acre are suggested for trial.

**Below, L to R: Arnold P. Benson, director, Illinois State Dept. of Agriculture, banquet toastmaster; George E. Metzger, secretary, Illinois Agricultural Association, speaker at banquet; and Dr. Willard, N. Central Conference president, presenting honorary membership scroll to Dr. Kephart at Springfield banquet.**

**New officers of North Central Weed Control Conference at Springfield following their election. Left to right: Glen Viehmeyer, University of Nebraska, vice-president; Dr. R. S. Dunham, University of Minnesota, president; and Dr. E. A. Helgeson, N. Dakota State College, secretary-treasurer.**

For row treatment, one third of these rates may be used. Mr. Barrons reported that "DNOSBP" is between 3 and 4 times as toxic as "PCP" to most species, although some specificity of action was noted. With quick-emerging crops, application at the time of planting, which permits combining of the two operations, gave as good control as delayed treatment. If a salt formulation is used for delayed application, miscible oil should be added to insure contact action on weeds that are already up, the paper added.

E. K. Alban, Ohio State University, Columbus, reported on tests of chemical weed control in horticultural crops. He told of pre-emergence applications of the alkyl ester of 2, 4-D at the rate of 1.0 pound acid equivalent per acre, on Mary Washington variety asparagus. Results after thirteen days were satisfactory, having controlled weeds for a period of seven weeks. There was no reduction in stand, or other visible damage noted to the asparagus seedlings, it was reported.

In post-emergence applications of 0.25 pounds of alkyl ester and 0.50 pounds of sodium salt of 2, 4-D, made when the seedlings were one inch high and protected by weeds which were twice as tall, the alkyl ester caused foliage burn of the seedlings, but controlled broad-leaved weeds. This made cultivation easier than in the untreated check plots. The sodium salt post-emergence treatment, while not causing damage to seedlings, did not give satisfactory weed control.

Other speakers on this portion of the program included L. L. Coulter and Wendell Molliyson, Dow Chemical Co.; G. F. Warren, U. of Wisconsin, Madison; R. E. Nylund, U. of Minnesota, St. Paul; A. L. Bakke, Iowa State College, Ames, Ia.; Glen Viehmeyer, Nebraska Agricultural Experiment Station, North Platte; R. F. Carlson, Michigan State College, E. Lansing, Mich.; and A. J. Abrahamson, Mount Arbor Nurseries, Shennandoah, Iowa.

The Section on Non-Tillable land heard E. H. McIlvain, U.S.D.A., Stillwater, Okla., tell of range improvement through sagebrush control with 2, 4-D. He stated that brush eradication studies since 1937 have proved that removal of sand sagebrush from sandy rangeland is an effective range improvement practice. Marked gains were seen in cattle grazing on this land, Mr. McIlvain reported. Airplane application of 2, 4-D, when properly done, kills up to 80 percent of the sagebrush and weakens the remainder, he said. The method was described as being "economical, rapid, and capable of yielding grazing results comparable or superior to mowing" which was previously referred to as "slow and costly." Tests during the past 3 years on 2,000 acres of land have indicated that one pound of acid equivalent per acre of ester, amine or salt is sufficient; slightly less than one pound of 2, 4-D as an ester may be satisfactory. One gallon of diesel oil per acre increases the effectiveness of both ester and salt solutions, and the minimum solution of 3 gallons

**Two views of banquet head table: (L to R) H. Goodwin; Glen Viehmeyer; Henry Luntz; T. H. Beeson; P. J. LaPine; L. R. Condon; and Charles H. Keltner. Second photo: Dr. Willard; Dr. Kephart; Dr. Dunham; Dr. W. W. Worzella; Dr. Helgerson; Dr. Clair Brown and Dr. Gilbert Ahlgren.**

## CONFERENCE POLICY COMMITTEE REPORT

*Because of space limitations in this issue, the report is summarized briefly here. We hope to run the entire report in the February issue.—Ed.*

*Perennial Weeds* require several 2,4-D applications for eradication. Treat during active growing stage, generally near bud stage. Higher rates of 2,4-D recommended where eradication is desired.

*Annual weeds* are more susceptible in the seedling and early stages under conditions conducive to vigorous growth. Some resistant weeds may be killed easily when young.

*Use of 2,4-D in growing crops.* In legumes underseeded in cereal crops, 2,4-D should be used only if some reduction in legume stand can be tolerated. . . . Flax should be sprayed as soon as enough weeds are present to make it practical. Flax is susceptible if sprayed in bud or bloom stage. . . . Control of annual weeds in winter wheat, oats and barley best in the spring when weeds are small and before crop reaches boot stage. . . . Corn is injured to some degree by 2,4-D regardless of dosage, but differences exist in tolerance of varieties.

*Pre-emergence use of 2,4-D* to be considered as an adjunct to corn cultivation, not a complete substitute on all soil types. Pre-emerg. treatment of corn is most effective when soil moisture is sufficient to cause rapid weed seed germination.

*Horticultural crops.* Chemical weed control in such should be regarded as aid to cultivation rather than a substitute. With exception of carrots and corn, much more research is needed.

*Potatoes, sugar beets. Legumes & Misc. Crops.* Use of 2,4-D, oils, pentachlorophenol, dinitros and TCA for weed control in these crops cannot be recommended because of lack of information.

*Woody Plants* sensitive to foliage sprays of 2,4-D can be killed by concentrations of 2,000 ppm (.2 percent) of the ester formulations. Should be sprayed when growing actively.

*New Herbicides:* "TCA" is promising for control of certain perennial grasses, including quackgrass, when used at 80 to 100 lbs. per acre . . . "IPC" at 3 to 5 lbs. per acre is promising for control of certain annual grasses . . . "PCP" shows promise for pre-emergence treatments in large seeded and vegetatively propagated crops. Small seeded crops look less favorable . . . Although not a substitute for 2,4-D, 2,4,5-T is effective on certain woody plants not susceptible to 2,4-D. Best use is in combination with 2,4-D.

*Hazards and Precautions:* Always danger that drift or vapors of 2,4-D and 2,4,5-T may affect nearby plants . . . esters are more volatile than sales . . . course sprays not so likely to drift . . . equipment and methods need to be developed to make safe the use of such herbicides.

per acre when using esters and 5 for sodium salt. Cross-wind flight intervals not more than one and one half the width of the boom are most effective, and the plants must be leafed out and making rapid growth in the spring (generally in May) for best results, the paper pointed out. It is possible to double the forage by application of from 3/4 to one pound of 2, 4-D by plane.

R. H. Beatty, of American Chemical Paint Co., Ambler, Pa., discussed the control of woody plants on rights-of-way, applying 2, 4-D and "2, 4, 5-T" (2, 4, 5-Trichlorophenoxyacetic Acid) separately and in combination. A feeling was expressed that all the woody plants normally found on rights-of-way in western Pennsylvania may now be controlled by means of combinations of 2, 4-D and 2, 4, 5-T esters. The exceptions, plants found resistant to these materials, are basswood, ash and beech. The materials were used both as a foliage spray and on cut surfaces experimentally as well as for actual right-of-way clearance. It was stated that not enough time has elapsed to evaluate results thoroughly.

Dayton Klingman, U. of Wyoming, Laramie, discussed the control of herbaceous weeds on uncultivated land; and M. W. Day, Dunbar Forest Experiment Station, Sault Ste. Marie, Michigan told of efforts to control undesirable trees and shrubs in a reforestation program, to round out the program in this section.

The evening session on Wednesday was held in two separate sections. One, "Investigations on Weed Control Methods in Sugar Beets, Potatoes, Soybeans, Peas and Similar Crops" was under the chairmanship of E. A. Helgeson, and the other, a "Symposium on Research in the Eradication of Woody Plants," was headed by L. W. Melander, U.S.D.A., Minneapolis, Minn.

Glen Viehmeyer reported on the use of chemicals to control weeds in potatoes. He said that 1/6 pound of 2, 4-D per acre applied as a spray and in the form of butyl ester to potato plants six to eight inches tall, gave an increase in the number of tubers set per plant. "Treated plants showed typical 2, 4-D curvatures for a few days following treatment as well as an apparent reduction of chlorophyll," the paper said. New leaves produced after treatment were reduced in size and thickened and twisted, he continued, but at digging time, it was found that the number of tubers set per plant had increased by 75 percent in the Cobbler variety, and by 54 percent in the case of Nebraska No. 2 variety. However, the yield of Cobbler was reduced by 2.5 percent, while the yield of Nebraska No. 2 was increased by 31 percent.

Other speakers in Dr. Helgeson's section included H. C. Young, Agricultural Experiment Station, Wooster, Ohio; W. E. Hall, Shell Oil Co., New York; Dr. Willard; Cyde Wilson, U.S.D.A., Columbus, Ohio; and H. E. Bruner, Monsanto Chemical Co., Akron, Ohio. These five discussed pre-emergence weed control in sugar beets. Discussing the weed control problem in sugar beets in North Dakota and Michigan, were Dr. Helgeson, C. R. Swanson, North Dakota State College, Fargo; L. M. Stahler, U.S.D.A., Brookings, S. D.; and B. H. Grigsby, Michigan State College, E. Lansing, Mich. R. T. Nelson spoke on "Some Recent Developments in Sugar Beet Control by Herbicidal and Mechanical Means."

The symposium on control of woody plants attracted some 200 persons. It was indicated by speakers that applications of herbicides with water and oil emulsions give better penetration and translocation than do straight water emulsions. Encouraging progress was made during the 1948 season for control of woody plants, particularly with use of 2, 4-D and 2, 4, 5-T. More information is needed about the latter, it was pointed out, but a more clearly defined pattern of the selective action of 2, 4-D was established during the past season. Ammonium sulfamate was again used in many tests, and despite certain limitations, the material will continue to maintain a place in the control of woody weeds, the chairman summarized. It was

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# *Particle Size and Toxicity of Aerosols Affected by*

# HETP CONCENTRATION*

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THOROUGH tests with hexaethyl tetraphosphate on numerous insects and more than 180 kinds of plants during 1947 and 1948 by Smith *et al*, have shown the material to be highly toxic to many important insect pests, and non-injurious to nearly all of the plants tested. The only ones to show injurious effects were tomatoes and certain varieties of chrysanthemums.

Insect pests to which hexethyl tetraphosphate is highly toxic in the active stages, are the two-spotted spider mite, ten species of aphids found in greenhouses, adults of the greenhouse whitefly, and the Mexican and citrus mealybug.

The few plants on which ill effects were noted, had been treated at a temperature between 70° and 90° F. Injury to tomatoes appeared in 24 hours as small water-soaked spots which later became necrotic. Injury to chrysanthemums was first recognized as scattered black dots which became surrounded by a pale halo. Under conditions of excessive dosage or high temperature, burning of young leaves of roses and carnations or spotting, yellowing and dropping of older leaves on roses was noted. In some tests as good control was obtained with less plant injury when the same weight of aerosol was applied at half the usual concentration.

A study was therefore made with several concentrations of hexaethyl tetraphosphate in methyl chloride to determine the effect of the concentration on the average particle size, or its efficiency in control of insects, and on the injury to plants. The test insects in this study were the foxglove aphid (*Myzus convolvuli* (Klth.)) and adults of the two-spotted spider mite.

## Preliminary Experiments

IN 1947 a series of tests was made (Smith *et al*. 1948) in greenhouses to determine the relative efficiency of 1, 5, and 10 percent of hexaethyl tetraphosphate (containing 21 percent of tetraethyl pyrophosphate) in methyl chloride. The results indicated a dosage of 0.08 gram of hexaethyl tetraphosphate per 1,000 cubic feet applied as a 1-percent aerosol to be as effective as 0.1 gram applied as a 5-percent aerosol or 0.2 gram applied as a 10-percent aerosol.

As a result of these observations, particle-size determinations were made, by the method described by Latta *et al*. (1947), on the aerosols produced from four concentrations of hexaethyl tetraphosphate (containing 12.3 percent of tetraethyl pyrophosphate), namely, 1, 5, 10, and 20 percent. The mass median diameters for the four concentrations at several temperatures are presented in figure 1.

The 20-percent concentration produced much the coarsest aerosol at 70° and 80° F., but at 90° and higher the particle size was similar to that produced by the 10-percent concentration. The solutions containing 1, 5, and 10 percent of hexaethyl tetraphosphate produced finer particles with increasing temperatures. The particle size also decreased for a given temperature with decreasing concentration.

The particle-size distribution determined for the four concentrations at 80° F. is presented in figure 2. The cumulative percentages of particles within different size limits in a 10-percent aerosol generated from solutions at 70° and 120° F. are shown in figure 3.

**TABLE 1**

**Discharge rates (grams per second) of hexaethyl tetraphosphate aerosols at different temperatures.**

| Concentration (Percent) | 70° F. | 80° F. | 90° F. | 100° F. | 110° F. | 120° F. |
|---|---|---|---|---|---|---|
| 1 | 2.35 | 2.76 | 2.87 | 2.97 | 3.15 | 3.35 |
| 5 | 2.30 | 2.73 | 2.85 | 2.94 | 3.10 | 3.31 |
| 10 | 2.30 | 2.73 | 2.85 | 2.93 | 3.10 | 3.31 |
| 20 | 2.25 | 2.70 | 2.83 | 2.90 | 3.10 | 3.29 |

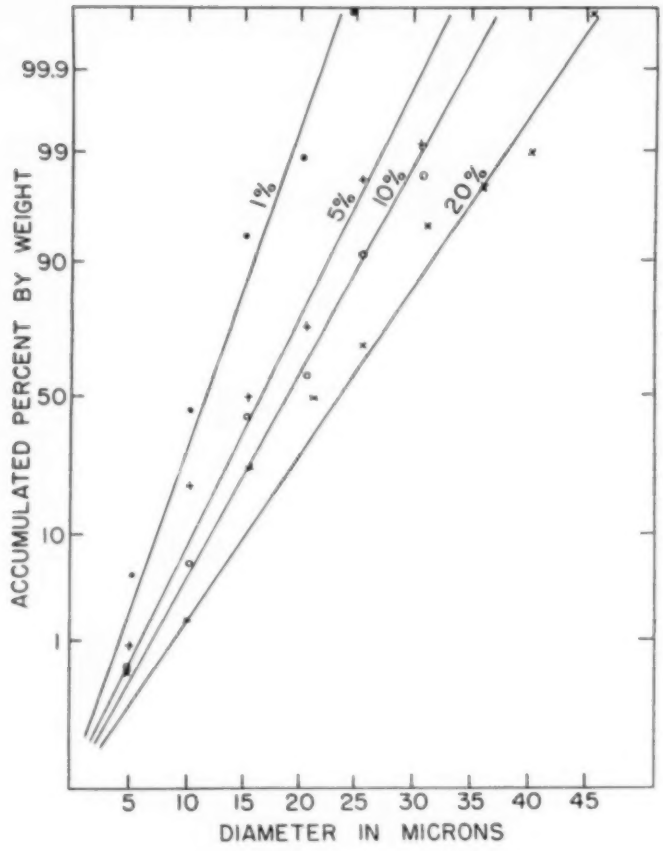
**TABLE 2**

**Particle-size distribution of two 20-percent hexaethyl tetraphosphate aerosols released at 150 pounds pressure, one by heating to 140° F. and the other by adding carbon dioxide at 70°.**

| Diameter of particles (microns) | Cumulative percentage of particles by weight | |
|---|---|---|
| | With heat | With carbon dioxide |
| 5 | 2 | 3 |
| 10 | 18 | 17 |
| 15 | 70 | 78 |
| 20 | 91 | 88 |
| 25 | 99 | 99 |
| 30 | 100 | 100 |

* Presented at annual meeting of the American Association of Economic Entomologists, New York, December 13-16, 1948.

TABLE 1




Raising the temperature increased the pressure of the methyl chloride, which in turn increased the flow rate of the aerosol solution through the nozzle. The rates of discharge of the four concentrations of hexaethyl tetraphosphate at various temperatures from 70° to 120° F. are shown in table 1. Even though the rate of discharge was increased with the temperature, the additional energy supplied by the liquid was sufficient to reduce the average particle diameter. (figure 1).

An experiment was carried out to determine whether the combination of increased pressure and higher temperature was necessary for reducing the particle size or whether pressure alone could accomplish the same results. A comparison was made of the particle size of aerosols from two solutions containing 20 percent of hexaethyl tetraphosphate in methyl chloride, one of which was heated to 140° F. where the pressure was 150 pounds per square inch, and the other was subjected to the same pressure by means of carbon dioxide. The results are shown in table 2. The fact that there was no difference in the particle size from the two solutions shows that change of viscosity of the insecticide resulting from the change of temperature does not influence the particle size of the aerosol significantly.

TABLE 3

**Percent mortality of foxglove aphids and spider mites exposed to 10-percent hexaethyl tetraphosphate[1] aerosol at varying periods after release. (Dosage 1 gram per 1,000 cu. ft.)**

| Minutes after release of aerosol | Test 1 | Test 2 | Test 3 |
|---|---|---|---|
| | Foxglove aphid | | |
| 0 to 15 | 100 | 98 | 99 |
| 0 to 30 | 100 | 100 | 99 |
| 30 to 60 | 89 | 89 | 76 |
| 60 to 120 | 4 | 60 | 29 |
| 120 to 180 | 1 | 12 | 29 |
| | Spider mite | | |
| 0 to 15 | 99 | 100 | 99 |
| 0 to 30 | 98 | 100 | 100 |
| 30 to 60 | 95 | 99 | 92 |
| 60 to 120 | 94 | 95 | 92 |
| 120 to 180 | 46 | 98 | 72 |

[1] 21 percent tetraethyl pyrophosphate.

## Toxicity of Aerosols

EXPERIMENTS were made in the greenhouse to determine the toxicity and performance of hexaethyl tetraphosphate aerosols.

One series was conducted to determine the duration of effectiveness of the particles released from the aerosol at temperatures betwen 75° and 80° F. Plants infested with foxglove aphids and with two-spotted spider mites were exposed following the application of hexaethyl tetraphosphate aerosols at dosages used in commercial greenhouses. The plants were removed at definite intervals and were replaced with unexposed infested plants. On the basis of the known falling rates of different-sized particles and the measurements of particles collected on glass slides, only the particles under 20 microns in diameter remain in the air more than 4 minutes and only those under 5 microns remain suspended after 15 minutes.

The results of these tests are shown in table 3. It is evident that hexaethyl tetraphosphate remains toxic to both the foxglove aphid and the

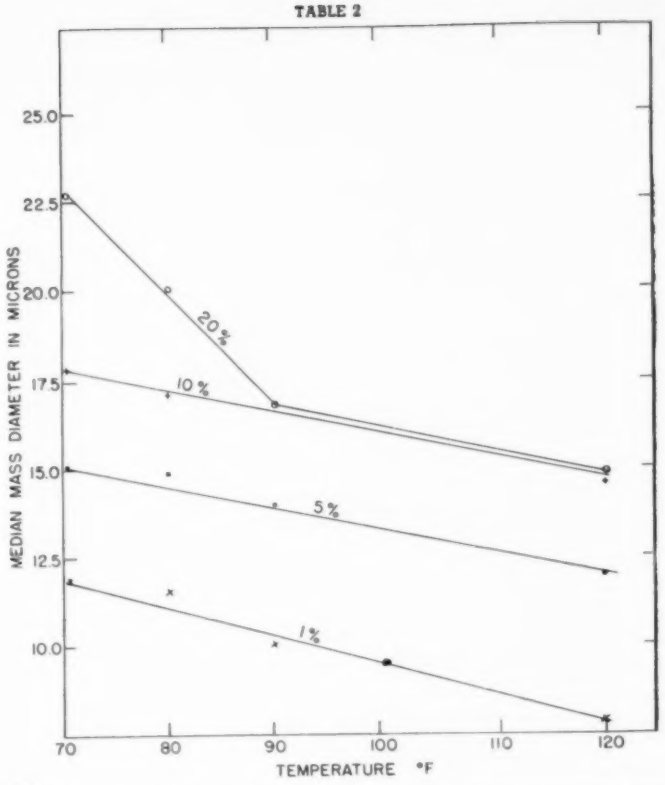
spider mite after the larger particles settle out of the atmosphere. The toxicity of these aerosols is highest in the first 30-minute period, but continues into the second 30-minute period for aphids and into the second hour for the mites. Their more prolonged toxic action to mites suggests that more than one component of the insecticide is responsible for the killing action, but these components are not known at the present time.

In additional greenhouse experiments, evidence was obtained on the rapid killing action of these aerosols and the distribution of toxic dosages at some distance from the point of their release. The time required to obtain high kills was variable, but high mortality levels were reached in some tests after only 2 minutes' exposure and in all tests after 10 minutes' exposure (table 4).

Experiments were conducted to determine whether the toxicity of the aerosol was increased when the cylinder and solution were heated before being released in the greenhouse. Aerosol solutions containing 5 and 1 percent of hexaethyl tetraphosphate (12.3 percent of tetraethyl pyrophosphate) in methyl chloride were weighed into paired cylinders. The solutions were discharged into 40,000-cubic-foot sections of a greenhouse, one of each pair being heated to 120° F. and the other unheated, (that is, at 70°). In succeeding tests the heated and unheated solutions were alternated in these sections. The kill of mites on bean and rose, as given in table 5, indicates that no advantage is derived from heating the solutions before discharging them.

In a further study on the settling rate of particles in relation to plant injury and toxicity, young plants of the highly susceptible tomato variety Italian Salad were exposed to 1 gram of hexaethyl tetraphosphate per 1,000 cubic feet applied as a 10-percent aerosol. The resulting plant injury and toxicity to mites are presented in table 6. Plants exposed for the first 5 minutes after release of the aerosol developed as many necrotic leaf spots as those exposed for the first 15 or 30 minutes and nearly as many as the plants getting the full

TABLE 2




60-minute exposure. Plants exposed in the house after 5 minutes and up to 60 minutes after release of the aerosol were uninjured. Thus injury is correlated with the time required for settling out of the particles more than 20 microns in diameter. The data on toxicity to spider mites corroborate the results presented in tables 3 and 4, which show that the insecticidal action of hexaethyl tetraphosphate when released in aerosol form is associated after the first 5 minutes with particles less than 20 microns in diameter and after 20 minutes with particles less than 10 microns. The injury to tomato plants is directly correlated with particles 20 microns or more in diameter.

## Discussion

THE data presented show that there is a definite relationship between the particle-size distribution of hexaethyl tetraphosphate aerosols and plant injury and insect control. Dilute solutions of hexaethyl tetraphosphate (1 and 5 percent) are more toxic, per unit weight of dispersed insecticide, than more concentrated solutions. This fact has been proved by using dilute aerosols and by allow-

TABLE 4

**Speed of killing action of 10-percent hexaethyl tetraphosphate[1] aerosols against the two-spotted spider mite. (Dosage 1 gram per 1,000 cu. ft.)**

| Minutes after release | At point of release | | | 40 feet from point of release | | |
|---|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | Test 1 | Test 2 | Test 3 |
| 2 | 81 | 77 | 96 | 5 | 7 | 14 |
| 5 | 61 | 94 | 98 | 7 | 32 | 78 |
| 10 | 96 | 98 | 99 | — | — | — |
| 15 | 96 | 99 | 99 | — | — | — |

[1] 21 percent tetraethyl pyrophosphate.

ing the coarse particles to settle before exposing the plants to the aerosol. The average particle size of hexaethyl tetraphosphate aerosols may be reduced in three ways—(1) by using more dilute solutions, (2) by heating to 120° F., and (3) by increasing the pressure with carbon dioxide.

The results of these experiments show that heating aerosol solutions reduces the particle size but does not increase their toxicity to mites. The discharge rate of heated aerosols is approximately 44 percent greater from a solution at 120° F. than from one at 70°, and the reported increase in toxicity in commercial greenhouses where the solutions are preheated is doubtless due to heavier dosages. Commercial cylinders filled to 80 percent of capacity with an aerosol solution at 70°, in conformity with Interstate Commerce Commission regulations, are liquid full at 130°. Heating the cylinder above this point presents an explosion hazard, because of the great increase in pressure and the weakening of the cylinder or valve. Heating of cylinders by greenhouse operators is therefore not recommended. Heating a 10-percent hexaethyl tetraphosphate aerosol or increasing the pressure with carbon dioxide does not eliminate the particles 20 microns or greater in diameter. Where there is danger of plant injury, the use of more dilute aerosols in amounts sufficient to obtain the recommended dosage for pest control appears to be safer and more reliable than heating a more concentrated aerosol.

FIGURE 3

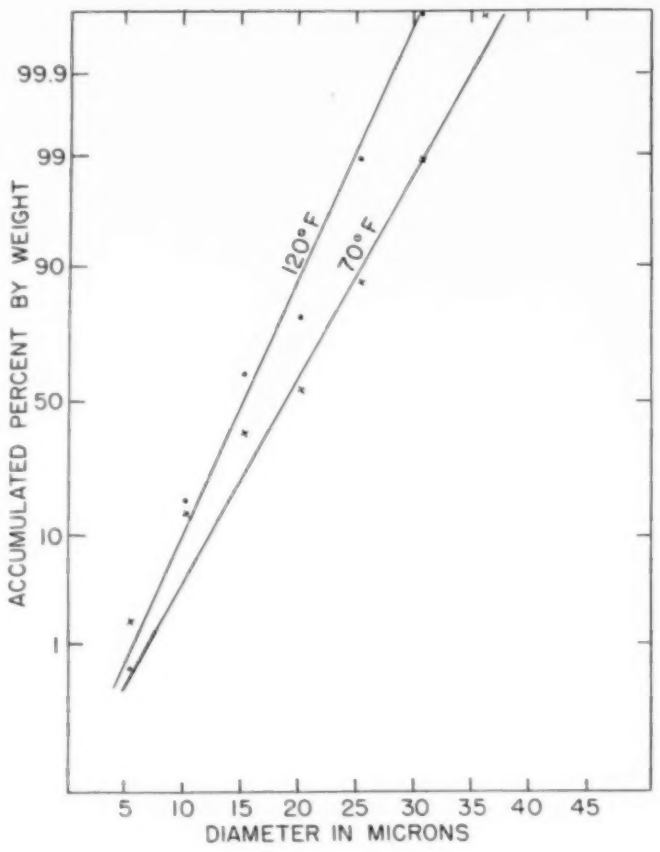



TABLE 5

**Toxicity of hexaethyl tetraphosphate[1] to spider mites in aerosols applied from solutions at different temperatures.**

| Temperature of greenhouse, °F. | Aerosol at temperature in greenhouse | | Aerosol warmed to 120° F. | |
|---|---|---|---|---|
| | Mites examined | Percent mortality | Mites examined | Percent mortality |
| | 0.05 gram per 1000 cu. ft. in 5-percent aerosol | | | |
| 74-76 | 238 | 93 | 226 | 94 |
| | 238 | 93 | 220 | 89 |
| | 0.025 grams per 1000 cu. ft. in 1-percent aerosol | | | |
| 72-74 | 234 | 45 | 254 | 30 |
| | 51 | 21 | 95 | 34[2] |
| 78 | 210 | 58 | 207 | 67 |
| 73 | 133 | 82 | 204 | 89 |
| | 77 | 95 | 112 | 96[2] |
| 70 | 112 | 85 | 159 | 89 |
| 78 | 364 | 91 | 622 | 88 |
| | 198 | 79 | 147 | 33[2] |
| 80 | 340 | 98 | 351 | 92 |

[1] 12.4 percent tetraethyl pyrophosphate.
[2] Mites reared on rose, all others on bean.

## Summary

A STUDY was made with several concentrations of hexaethyl tetraphosphate in methyl chloride to determine the effect of the concentration on the average particle size, on its efficiency in control of insects, and on the injury to plants.

The physical properties of the hexaethyl tetraphosphate aerosols were such that of the dosages tested, the largest percentage of the fine particles (10 microns or less) were produced by a 1-percent aerosol, and progressively fewer fine particles by 5-, 10-,

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# The Test of Time Proves Efficacy of Commercial FERTILIZERS

by

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ALTHOUGH a century of experience has convinced real dirt farmers of the value of chemical fertilizers in maintaining soil productivity and for increasing crop yields, a great many suburbanites and apartment-house dwellers, with only back-yard experience to go by, have been led to believe that "chemical fertilizers are ruining our soil and our health."

Because of the doubts that have been raised on these points, it seems advisable from time to time to re-examine the evidence on the subject. The best starting point is an experiment which was established at Rothamsted, England, in 1852, and which has been continued ever since. The records at hand, shown in Table 1, cover a consecutive period of 95 years, and they certainly give no cause for concern.

Now, after the passing of nearly a century, it is easy to find fault with the original plan of that experiment in relation to the needs of today's agriculture. For example, growing wheat continuously on the same land is not considered good practice in humid regions. Animal manure is not a balanced soil amendment, since it needs to be reinforced with phosphate. The ratios in which the several fertilizer elements were supplied are not necessarily the ones that are best suited for the long-time needs of the soil and crop. And good soil-management practice calls for growing deep-rooted legumes at regular intervals for their physical effect on the soil, as well as for their usefulness in supplying nitrogen.

Notwithstanding these defects, one cannot fail to note that the plot which received 1392 pounds of fertilizer annually outyielded the plot receiving an annual dose of 15.7 tons of manure. This is true not only for the first 10 years and the first 40 years, but for the entire 95-year average. During the last 5 years, the yield of the fertilized plot averaged 4.4 bushels higher than that of the manured plot.

For those who decry the use of commercial fertilizers, this is a bitter pill to swallow. Not being able to claim any yield advantages for manure, they credit it with certain intangible values. Three claims are usually made. One is that manured plants have hidden qualities that make them superior for human consumption. A second is that such plants continue to reproduce themselves, whereas fertilized plants "run out," with the result that new seed has to be brought in from other areas. A third is that manure favors the soil-renovating earthworms, but fertilizers tend to destroy them.

A great variety of miscellaneous observations have been assembled by the antagonists of the fertilizer industry in support of such beliefs. Having made their interpretations of these observations, they assume that these three concepts have been proven, and they state them as facts. Circumstantial evidence of this type merits study, but it cannot be relied upon until

**TABLE I**

**Ninety-five Years of Continuous Wheat at Rothamsted †**
**Average Yields of grain in bushels per acre.**

| Plot | 3 | 2B | 8 | 7 | 13 |
|---|---|---|---|---|---|
| Annual Application Per Acre | None | Manure tons 15.7 | Fertilizer lbs. 1392* | Fertilizer lbs. 1161 | Fertilizer lbs. 99* |
| Periods | bu. yield | bu. yield | bu. yield | bu. yield | bu. yield |
| 1852-61 | 15.9 | 34.2 | 36.0 | 34.6 | 32.9 |
| 1862-71 | 14.4 | 37.5 | 40.5 | 35.8 | 34.8 |
| 1872-81 | 10.2 | 28.7 | 31.2 | 26.8 | 26.7 |
| 1882-91 | 12.5 | 38.1 | 38.1 | 34.9 | 32.2 |
| 1892-01 | 12.3 | 39.1 | 38.5 | 31.7 | 29.1 |
| 1902-11 | 10.8 | 35.1 | 37.2 | 30.9 | 32.0 |
| 1912-21 | 7.9 | 26.4 | 25.4 | 22.4 | 21.5 |
| 1922-31** | 7.6 | 21.6 | 21.7 | 21.7 | 19.9 |
| 1932-41 | 12.7 | 26.1 | 31.0 | 26.9 | 25.7 |
| 1942-46 | 15.7 | 34.3 | 38.7 | 35.3 | 30.8 |

† The data were obtained through the courtesy of H. V. Garner.

* The 1392 lbs. of fertilizer that were used on plot 8, supplied an estimated 129 lbs. N, 66 lbs. $P_2O_5$, 192 lbs. $K_2O$, 17 lbs., MgO, and 14 lbs. $Na_2O$. On plot 7, the N was reduced to 86 lbs. Plot 13 received the same fertilizer as plot 7, except that no MgO or $Na_2O$ was used.

** From 1925 forward, a system of fallowing to control weeds, which had become a very troublesome problem under continuous cropping to wheat, was adopted. This is without importance in so far as *relative* yields are concerned.

substantiated by careful checking. To date, such checking has failed to yield any dependable scientific evidence that any one of these three concepts is valid. In other words, there is no evidence whatever that fertilizers, *when rightly used*, cause any deterioration of the soil, have any injurious effects on plants or earthworms, or cause any deterioration in the food values of plant products.

The most important reason for saving and using manures and composts, as against fertilizers, is that they can often be had at very little expense. Manure is a valuable by-product of the livestock industry. It should be carefully saved and used on the soil. In addition to its low cost to the farmer, it may, and often does, have the advantage of containing a greater variety of mineral elements than fertilizers do. Thus it contains a portion of everything, including the minor elements, that the plant from which it was produced took out of the soil. If the feed that went into the cow came from several regions, so much the better, since this means that the manure is the product of several soils.

The ordinary backyard compost pile may have even greater merit than animal manure, because it is likely to be the product of plants from all over the earth. Thus, waste leaves of cabbage from the Rio Grande Valley, peeling of oranges from Florida, tops of carrots from California, shells of eggs from New Jersey, grounds of coffee from Brazil, spent tea leaves from China, and plant refuse from the local yard and garden, may all go into the making of the suburbanite's pile. No wonder he gets such good results from its use, when he piles it on heavy!

Those who seek to make the public believe that fertilizers are ruining the soil and the health of the Nation, assume that the cow contributes something to the manure that wasn't in the grain and hay that were fed her. This something would have to be a product of the hormone type. It is further assumed that no such growth-stimulating or health-giving substance can be produced by the microorganisms that inhabit the soil. Otherwise, one could accomplish the same purpose by plowing under sods and cover crops.

In so far as the effects on yield are concerned, there is nothing in the evidence to suggest that organic materials must be passed through a cow if they are to be of maximum benefit to the soil. They must be digested, but this digestion can be accomplished by the microorganisms that inhabit the soil as well as by those that do the necessary work in the cow's rumen. The process is speedier in the cow, just as it is in the well-constructed compost heap, because of the favorable temperatures that are maintained. It will be slower in the soil, especially in cool weather, but this merely means that a longer period of time will be required for its digestion.

The rate of digestion of plowed-under crude organic matter can often be speeded up greatly by the supplemental use of chemical nitrogen and phosphorus. The explanation for this is found in the fact that microbial cells contain around 10 percent nitrogen and 5 percent phosphoric acid, on the dry basis. If the plowed-under material is naturally rich in these two elements, no additions of them are necessary. Thus, no problem of this type is presented by the plowing under of green sweet clover, soybeans, alfalfa sods, and other similar legume crops. When straw, cornstalks, timothy sods, and similar materials are plowed under or worked into the soil, extra nitrogen is required. Straw, for example, contains only about 0.75 percent nitrogen, and enough more of the element must be added to raise this to about 2 percent. This is approximately the nitrogen content of legume hay crops at the early blossom stage.

This principle can be applied to good effect in the making of compost. Thus, it is now common practice to sprinkle cyanamid, or sulfate of ammonia plus lime, over the successive layers of plant material as they go into the compost heap. In ordinary practice, about 60 pounds of cyanamid, or 120 pounds of a half and half mixture of sulfate of ammonia and pulverized limestone, and 30 pounds of superphosphate per ton dry-weight of material meets the requirements. Most back-yard gardeners will find it more convenient to use about 200 pounds of a standard complete fertilizer and a small quantity of lime instead of the separate materials.

It must be kept in mind that the chemicals are used merely to speed up the decomposition process. Any pile of plant refuse will, if kept moist, gradually decay to form compost. By adding the lime and fertilizer, the microbes are stimulated to more speedy action. Thus, the chemicals are substitutes for time. For those who appear to be so disturbed about the use of chemicals, it might be well to point out that chemical nitrogen is now being fed to cows on a large scale. The microbes that digest the feed in the cow's rumen often need more nitrogen than is contained in the grain and roughage that are fed. In proportion, extra nitrogen, in the form of urea, is being used to good effect. The nitrogen is required for the necessary production of protein in the bacterial cells.

The importance of manure as a direct source of organic matter in general farming, has been greatly exaggerated. Used at the 100-ton-

**TABLE II**

**Fifteen-Year Accumulation of Organic Matter at West Virginia ***
**(All figures calculated to the acre basis for entire period)**

| Materials Applied | Quantities Applied Tons | Amounts of N lbs. | P$_2$O$_5$ lbs | K$_2$O lbs. | Crop Produce Totals lbs. | Organic Matter In Plow Depth lbs. |
|---|---|---|---|---|---|---|
| None | 0 | 0 | 0 | 0 | 40,960 | 42,800 |
| Fertilizers* | 5 | 672 | 672 | 812 | 117,910 | 60,800 |
| Manure | 100 | 1,900 | 950 | 1,900 | 139,670 | 73,600 |

* Consisting of a mixture of nitrate of soda, superphosphate and sulfate of potash.

**TABLE III**

**Two-Year Comparison of Manure-Ash Plus Nitrogen at West Virginia**
**(All figures calculated to the acre basis)**

| Material Applied | Rye | | Wheat | | Total Dry Weight |
|---|---|---|---|---|---|
| | Grain lbs. | Straw lbs. | Grain lbs. | Straw lbs. | lbs. |
| Manure, 20 tons | 1913 | 3587 | 1920 | 4580 | 12,000 |
| Ashes* + N | 2095 | 4845 | 1880 | 3320 | 12,140 |
| None | 1100 | 2070 | 1070 | 1830 | 6,070 |

* Ashes from burning 20 tons of manure plus N equivalent to that lost by burning.

or-more-per-acre rate at which the back-yard gardener may apply it, or the compost that he substitutes for it, very marked improvement in both soil and crop can be effected. But a 10-ton-per-acre application, such as a farmer might have at his disposal, would add only about 2½ tons of organic matter, of a readily decomposable type, to the 30 tons of organic matter already in the plow depth of the average acre of soil. Any very large and dependable increase in soil organic matter from the use of manure will not come from the manure itself, but from the larger crop yields that are produced by the manure, and the greater amounts of roots and crop residues associated therewith.

But fertilizers can be used to accomplish the same purpose. They grow bigger crops that leave larger amounts of plant refuse on and in the soil. The most conclusive evidence on this point so far presented is that developed by Dr. R. M. Salter and the writer at the W. Virginia Experiment Station some 30 years ago. A small part of the data from this work is shown in table 2.

During the 15-year period of this test, four clean-culture, five small-grain, and six clover-timothy hay crops were grown. Manure and fertilizers, used at rates of 190 tons and 5 tons per acre, respectively, were compared on nearby plots. The manure produced higher yields than the fertilizer, but this was to be expected, since it supplied more than twice as much N, $P_2O_5$ and $K_2O$ as the fertilizer.

It will be noted that the soil's content of organic matter, to plow depth, was increased from 42,800 to 60,800 pounds, or over 42 percent, by the use of purely mineral fertilizers. This can be accounted for only by the greater amounts of roots and other crop residues that were left behind on and in the soil by the nearly tripled crop yields resulting from the use of the fertilizer.

Most of the extra organic matter that was accumulated in the manured plot can be accounted for in the same manner. Thus, by using the yield data, one can readily calculate that only about 8,000 of the 95,000 pounds dry-weight of organic matter per acre which was supplied by the manure remained in the soil at the end of the 15-year period. The remaining 22,800 pounds of extra organic matter that had accumulated in the soil during the 15-year period came from the roots and residues of the larger crops that were grown by its use.

The yield-increasing effectiveness of manure, when applied at ordinary farm rates, is determined mostly by its content of N, $P_2O_5$, $K_2O$, and by such other mineral elements as are released from it during decay in the soil. Microbial decomposition is a low-temperature ashing process. It yields the same mineral elements as would be found in the ashes if the manure were consumed by fire. During the low-temperature ashing by the microbes, however, the N, which would have gone up in smoke at high temperatures, is saved and made available to the crop. If one burned manure, and then added as much N to the ashes as was lost in the burning process, he would then have what the manure contributes in the way of fertilizer elements.

For two years, a direct comparison was made of 20 tons of manure per acre annually and the ashes from burning the same quantity of manure, to which the necessary mineral nitrogen to make up the loss of this element was added. Crop data for this comparison are shown in Table 3. The soil on these plots was in a low state of fertility. Nevertheless, it will be noted that the manured plot did not produce as much dry weight of crops as the fertilized plot. No extra values were observed from the microbial and organic constituents of manure.

It will be noted, however, that the manure produced a higher yield than the fertilizer during the second year. It becomes necessary, therefore, to examine this point further. In 1915 the Ohio Experiment Station set up a test to compare 4 tons of manure per acre with chemical fertilizers containing the same amounts of N, $P_2O_5$, $K_2O$. This experiment was continued for 23 years. The rotation was corn, oats, wheat and clover. The manure and fertilizer were all applied in preparation for corn. The data on crop increases are shown in Table 4. They demonstrate quite clearly that chemicals, when they supply equivalent amounts of N, $P_2O_5$ and $K_2O$, are as effective as manure.

After 40 years of study of this problem, Charles E. Thorne, then Director of the Ohio Agricultural Experiment Station, wrote as follows:

"*When manure has been com-*

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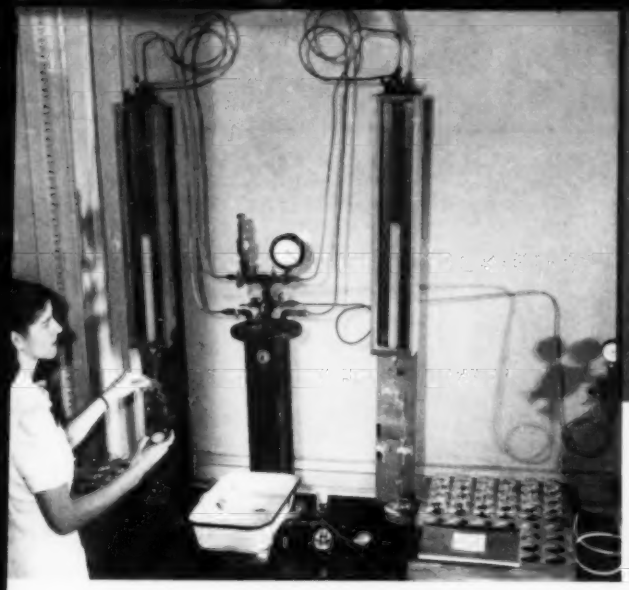
**TABLE IV**

**Twenty-Three Year Comparison of Manure and Chemicals — Ohio**
**Acre Increases in Yield and Value**

| Treatment | Corn bu. | Oats bu. | Wheat bu. | Clover cwt. | Value Dollars |
|---|---|---|---|---|---|
| Manure, 4 tons | 11.0 | 4.1 | 2.4 | 2.77 | 10.00 |
| Equivalent chemicals | 10.5 | 6.0 | 3.4 | 1.68 | 10.78 |
| Manure + $P_2O_5$* | 14.6 | 7.7 | 10.1 | 5.74 | 21.00 |
| Chemicals + $P_2O_5$* | 13.8 | 10.0 | 9.8 | 6.89 | 21.48 |

* Superphosphate, 20 percent, applied at rate of 380 pounds per acre.



*Improving BHC through*

# HIGH GAMMA

## isomer content

(Left) Laboratory apparatus developed by Pennsylvania Salt Mfg. Co. for chromatographic determination of gamma isomers of benzene hexachloride. This process has helped to simplify the manufacture of BHC insecticides with high gamma isomer content.

EXPERIMENTS conducted over a period of several years, continue to indicate a promising future for benzene hexachloride as an insecticide for agriculture, animal husbandry and the dairy industry. The cotton boll weevil and cotton aphid, the fall army worm, the lygus bug, the looper, plum curculio, the spinach leaf miner, and the wooly apple aphid are particularly susceptible to benzene hexachloride. This compound has also proved effective in the control of various animal parasites, particularly ticks, lice and mange mites and of lice and mites on domestic fowl. Since it acts as a fumigant as well as a stomach and contact poison, benzene hexachloride has been found to be effective in the control of soil pests such as wire worm and the grubs of Japanese beetle and the white fringed beetle. Recently benzene hexachloride has been used successively as a spray application for the walls of dairy barns to control flies and has exhibited the ability to hold its effectiveness over a considerable period of time.

The insecticide trade is well acquainted with the history of benzene hexachloride, also known as "666" and as 1,2,3,4,5,6-hexachlorocyclohexane. It is not a late discovery, having been prepared first by Michael Faraday in 1825. The use of the material as an insecticide, however, was first reported in 1935 and general interest in the compound was aroused during the late war when French and British scientists confirmed its insecticidal properties in independent investigations.

Since the war, a number of American manufacturers have offered benzene hexachloride insecticides in a variety of forms and in widely differing concentrations.

Chemists have known for many years that benzene hexachloride as produced by the chlorination of benzene is not a single pure compound. Instead, it is made up of a number of closely related molecular structures designated as isomers. There are five known isomers which differ very little in their chemical behavior and only to a small degree in their physical characteristics. Curiously, however, they differ greatly in their insecticidal activity.

The isomers represent different geometrical arrangements of the six chlorine atoms, each of which is bonded to one of the six carbon atoms which form the hexagonal cyclohexane ring. There is also a hydrogen atom bonded to each of these carbon atoms. Chlorine and hydrogen atoms may lie on either side of the ring and a number of different arrangements are thus possible.

The several isomers have been labelled non-committally by the Greek letters, alpha, beta, gamma, delta and epsilon. Although not all of the molecular structures have been established, it is quite certain, however, that in the beta isomer, adjacent chlorine atoms are located on alternate sides of the cyclohexane ring. The gamma isomer, in which probably two chlorine atoms are on one side of the carbon ring and four chlorine atoms on the other side, is the only one which is significantly effective in insect control.

### Gamma Isomer Effective

THE initial product resulting from the chlorination of benzene contains only about 10 to 14% of this gamma isomer. Finished insecticides compounded from the original isomer mixture must therefore contain from 6 to 9% of unwanted isomers for every 1% of gamma isomer. The other isomers contribute little or nothing in total insecticidal value, but do build up the total dosage required in any given application. They thereby increase the possibility of phytotoxic action or of taste and odor contamination. Certain experiments have suggested the possibility that toxic action of the gamma isomer may be to a slight extent counteracted by the physiological action of the other isomers.

In any case, it is recognized that the higher the concentration of gamma isomer in the total benzene hexachloride content, the more effective is the finished insecticide and the

(*Turn to Page 78*)

# Fluctuations Characterize the

# PESTICIDE MARKET

by

**Melvin Goldberg**
Pesticide Advisory Service
37 Wall Street, New York

THE price of technical DDT is fluctuating once again! As was announced in the December issue of this column, a major producer of technical DDT had announced an increase in the price from 34c lb. to 36c lb. in CL quantities. This increase was followed by others. Many in the industry felt that this would have a stabilizing effect on the demand for this material, but, in the early part of December a large Government bid calling for the delivery of some 800,000 lbs. of technical DDT to be delivered over the first half of 1949 was opened, and the low bids were in the vicinity of 32c to 33c lb. There were other bids in the 32c to 36c category.

Meanwhile, the price of ethyl alcohol had declined which was probably another contributing factor to an announcement by two major producers of a decline in the price of technical DDT to 32c lb.

Of interest is the fact that the U. S. Department of Agriculture will continue to recommend the use of DDT in fly control, according to E. F. Knipling of the Bureau of Entomology & Plant Quarantine in a talk at the NAIDM meeting in New York in December. Dr. Knipling declared that although DDT failed in many situations, it was also used successfully in many places, and for that reason the agency will continue to recommend it. He stated that sanitation and proper application of the insecticide will be emphasized but that there will be no outright recommendation for use of substitute insecticides. The Department suggests experiments with other chemicals such as chlordane and benzene hexachloride.

It is still not possible to evaluate what effect the resistance of DDT to flies will have on the production and consumption of DDT insecticides for the coming season, but it is clearly indicated that the total production for the calendar year 1948 will not exceed 30 to 35 million pounds. It is of interest that the September production of DDT according to the Tariff Commission reports amounted to 834,418 lbs. which was the highest monthly production since April 1948.

### Chlordane

BOTH producers of technical Chlordane have announced a price decline and there is an active demand at the present time for the material. A recent release from the U. S. Department of Agriculture is concerned with the effectiveness of the material for Japanese beetle grub control, as well as for the control of other soil inhabiting insect pests in the grub stage. The use of chlordane for wire worm control mixed in with fertilizers in some instances is receiving additional interest by formulators.

### Benzene Hexachloride

CURRENT quotations for technical benzene hexachloride by most producers in CL quantities is 2¾c. per gamma unit. However, there are reports that where season requirements are involved that the price is less than the CL price indicated. One small producer is quoted offering the material at 2c per gamma unit, but no confirmation has been possible. 50% dust concentrate is being quoted in export circles at 2.5c per gamma unit, while domestic dust prices to the trade are being quoted in the vicinity of 3c per gamma unit.

The season is about here when manufacturers of finished cotton dusts will be scheduling in their requirements and demand should be active during the next 2 to 3 months.

### Pyrethrum

WITH increasing interest in the use of purified pyrethrum concentrates in the low pressure aerosols for household use, the supply situation appears to be tightening up all along the line. For the most part, flowers purchased at reduced prices are drying up and the higher cost flowers are gradually being put into process, so that it was expected that the price of pyrethrum would rise after the first of the year. In fact most producers are advising their trade of the imminence of a price increase.

### Parathion

PARATHION is now being offered by at least three major producers. The price for the 94% grade is $2.50 lb. in CL quantities and $2.55 lb. in lcl quantities. The so-called aerosol grade which is produced by only one company, is $3.00 lb. There is difficulty in evaluating the actual concentration of the active ingredient which has caused the slowing up of some of the deliveries.

However, it is the opinion in trade circles that material at the present time is in fairly tight supply.

(*Turn to Page 77*)

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# The Listening Post

## Plant Disease in New, Unusual Occurrences

**This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.**

**By Paul R. Miller**

OCCURRENCE of onion smudge in Washington this year is reported by S. B. Locke, of the State College of Washington. This disease, caused by fungus *Colletotrichum circinans*, is widely distributed east of the Rocky Mountains, but has not been reported from the Pacific Coast region before. In view of the unrestricted shipment of bulbs and sets into Washington from areas where smudge commonly occurs, it is probable that the fungus has been introduced at various times, but that development of the disease has been prevented by climatic factors. The appearance of smudge in the vicinity of Pulman, Washington, this season supports this assumption. In this area, onions ordinarily are harvested and cured under conditions unfavorable for infection. This year two instances were noted where onions grown from sets were left in the ground until after the first fall rains. Upon digging, white varieties in these plantings were found to be infected with the smudge fungus, which was fruiting abundantly on the outer scales. Colored varieties, which are resistant to the disease, grown at the same locations and handled in the same way, showed no visible signs of infection. White varieties dug before the rains were likewise not infected.

### Disease in California

THE *Cladosporium* spot disease of cowpea, caused by the fungus *Cladosporium vignae*, is reported from California for the first time by J. B. Kendrick, Jr., and John T. Middleton, of the University of California Citrus Experiment Station. Specimens of diseased cowpea plants received from Orange County during the late summer of 1947 showed numerous lesions on the penducles, pods, and seeds. Infected pods were misshapen. The fungus was sporulating abundantly on the surface of all lesions. When infected seeds from this collection were sown in sterilized soil in the greenhouse, the seedlings obtained showed stem lesions typical of seedling infections due to this disease. This demonstrates that the disease can be seed-borne.

In August of 1948, additional diseased cowpea material was received from Orange County. The material represented four different non-adjacent fields planted with seed from two sources. Symptoms were similar to those seen in 1947 and the same fungus was again isolated.

Weather and growth conditions apparently were ideal both years for the development of the fungus. In 1947 the affected plants exhibited rank growth. A considerable amount of foggy weather prevailed during the period when the pods were developing. The abundant growth together with the excessive dampness combined to maintain sufficient moisture for development and spread of the fungus. Again in 1948 relatively cool and foggy weather persisted during the period of pod formation, thus favoring occurrence of the disease, which apparently was introduced with contaminated seed stock.

### Root Rot in Texas

FIVE fields of the California Wonder variety of ball pepper near Troup, Texas, in September, showed from 1 to 20 percent of the plants to be wilting or dead. According to P. A. Young of the Texas Tomato Disease Laboratory, the cause was found to be the charcoal rot fungus, *Sclerotium bataticola*. This is a widespread soil-borne organism with numerous hosts, but apparently it has only rarely been associated with disease of peppers. Symptoms observed in affected fields ranged from slight wilting and drooping of the leaflets to defoliation and browning of the stems. The disease developed in unusually hot and dry weather in August that favored the fungus and retarded the growth of the peppers. Examination of three rows of Pimiento peppers revealed no plants with charcoal rot.

### Peanut Rust in Louisiana

A. G. PLAKIDAS of the Louisiana Agricultural Experiment Station reports the discovery of rust, caused by *Puccinia arachidis*, on peanuts in Baton Rouge in October. Sporadic appearances have been reported from some other southern States, but this seems to be the first observation of the disease in Louisiana. Infection was limited to one spot of about eight feet long at one end of a 200-foot row. The affected plants were badly "rusty" and defoliated, illustrating the potential destructiveness of this disease.

### Curvularia Spot in Miss.

GLADIOLUS *Curvularia* spot disease was first observed in Florida and Alabama in 1947, as reported in an earlier number of the Listening Post (February 1948). A. G. Plakidas of the Louisiana Agricultural Experiment Station reports that in August of this year the county agent at Carthage, Mississippi, sent a specimen of gladiolus leaves with numerous large, brown to black spots, with the statement that a field of 150,000 plants, both from local and from Oregon-grown corms, were affected in this manner. *Curvularia* was found fruiting abundantly on the spots.

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### "Fire" Disease in California

IN the spring of 1947 a watery decay was observed on some King Alfred daffodil blossoms held under humid conditions at the University of California at Los Angeles. According to Lily H. Clark, who reports this occurrence, the associated organism was found to be the fungus *Botrytis polyblastic*, the cause of "fire" disease. The disease is geographically quite restricted, being known to occur in England, Scotland, Ireland, and Jersey, and in the State of Washington. This report from southern California extends the known distribution. Only the flower symptoms could be observed at the time the disease was discovered, since the blossoms were obtained from a local florist and the grower could not be determined. It is known that serious spotting may develop in transit on flowers that seem sound when packed. This apparently occurred in the present case since the florist reported having had difficulty in keeping some of the blooms. Seemingly healthy flowers rotted overnight when subjected to warm humid conditions. Various workers have reported the King Alfred variety to be only mildly affected by fire, serious attacks being limited to a few cases. This appearance of the disease in California does not reveal whether it came in on shipped cut-flowers or is established in the State. Because of climatic conditions, however, it is not likely to become damaging in California.★★

## Spread of Corn Borer Continued in 1948

**This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.**

**By G. J. Haeussler**

EUROPEAN corn borer continues to spread in many parts of the U. S. The pest was found during 1948 in 116 counties and in one State, Louisiana, which had not been known to be infested previously. A survey, recently completed by the Bureau of Entomology and Plant Quarantine in cooperation with State agencies, disclosed 35 new county infestations in Missouri, 34 in South Dakota, 20 in Nebraska, 7 in Tennessee, 4 each in Virginia and West Virginia, 3 in Kentucky, 2 each in Minnesota and North Dakota, and 1 each in Kansas, Louisiana, Maryland, Michigan, and North Carolina. The Louisiana record was based on a single specimen taken from corn near the town of Laplace, in the Parish of St. John the Baptist. That find is about 450 miles from the nearest known infested counties in Tennessee and Missouri. This insect is now known to occur in a total of 1,167 counties and one parish in 29 states.

In general the corn borer was somewhat more abundant in this country during 1948 than in 1947. An increase in abundance in some parts of the infested area more than offset a decrease that occurred in certain sections that were most heavily infested in 1947. In the East, borer populations appeared to have increased over those of 1947 in Maine, New Hampshire, Massachusetts, Connecticut, Rhode Island, Pennsylvania, Delaware, and North Carolina. The average population in New Jersey showed no apparent change, while that in Vermont, New York, Maryland, and Virginia was lower in 1948 than in 1947. In the North Central region the average population of the insect remained about the same in Indiana and Illinois as during the preceding year; the borers were more abundant in 1948 in Ohio, Iowa, and Missouri, than in 1947; while populations decreased in abundance in Kentucky, Wisconsin, and Minnesota.

In some instances there were decided changes in the population status in various sections of individual states in 1948 as compared to 1947. For instance, population increases in northern and east central districts of Indiana offset decreases in other parts of the State, and a somewhat similar situation occurred in Illinois. In Iowa, the increase occurred in all but 2 of 12 districts surveyed, while in Minnesota the decrease occurred chiefly in the southeastern counties. Standard corn borer abundance surveys were made in 1948 for the first time in Nebraska, North Dakota, South Dakota, and West Virginia. There was thus little basis for comparison of abundance in those states as compared to the situation in 1947.

### Vegetable Pests in South

MEXICAN bean beetles persisted in light numbers on beans in parts of Florida and Georgia during late November and the first half of December. The serpentine leaf miner was destructive on beans in parts of Florida during that period, and a potentially serious infestation of the bean leaf roller was threatening in some parts of that state early in December. Toward the middle of that month, the lesser cornstalk borer was increasing on beans in the Everglades.

Cabbage caterpillar infestations were generally moderate to heavy in practically all southern districts, except Louisiana, from which reports were received in late November and early December. During the first half of December, aphid populations on crucifers were moderate to heavy in South Carolina and in southern California. These aphids were light to moderate in other districts reporting, except in the lower Rio Grande Valley of Texas where they were destructive on turnips toward the middle of the month. The vegetable weevil was generally abundant in the South during the first half of December, causing damage to crops including turnips, Chinese cabbage, and mustard. Other pests reported causing injury to cole crops in the South at this time include webworms, cucumber beetles, southern

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# Suppliers' Bulletins

### U.S.D.A. Livestock Data

The U. S. Department of Agricultural has issued bulletin E-762, "New Insecticides For Controlling External Parasites of Livestock." The objectives of the report are threefold: (1) to summarize the results of research conducted to date and to compare the performance of the different materials against various livestock pests; (2) to summarize briefly the available knowledge on the toxicity of the materials to animals; and (3) to issue guiding statements on how the new materials may be used if their use is warranted at this time. The bureau adds that it is reluctant to offer such guiding statements at this time. "But the materials are available and are being used," it continues . . . "in some cases without regard to the hazards involved and without the benefit of available knowledge regarding their effectiveness.

Results of tests with various insecticides are given in the folder. These materials include benzene hexachloride, chlordane, chlorinated camphene, methoxychlor, TDE and piperonyl butoxide. Copies are available from the U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine, Washington 25, D. C.

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### Sprayer Catalog Issued

F. E. Myers & Bro. Co., Ashland, Ohio, has announced the availability of its new catalog describing its complete line of power sprayers, spray guns, nozzles, accessories and fittings. The new line of "General Purpose" power sprayers is included.. These models feature the ability to convert from one model to another. They are manufactured in four basic models: the engine driven skid model, two-wheeled engine driven model, four-wheeled engine driven model and the two-wheeled power take off model. All have the same frame construction and the units are adaptable for all spraying requirements, the company states. The catalog, No. PSC-49 is available from the company's main office, Ashland, Ohio.

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### Storage Bulletin Offered

Barrett-Cravens Co., Chicago, has announced the release of its "Storage Rack Bulletin No. 4873", a 16 page booklet suggesting means of increasing storage space without new construction. Numerous illustrations point out storage economies applicable to chemical manufacturers and others faced with handling of drums and bulky items. Copies of the bulletin are available from the Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.

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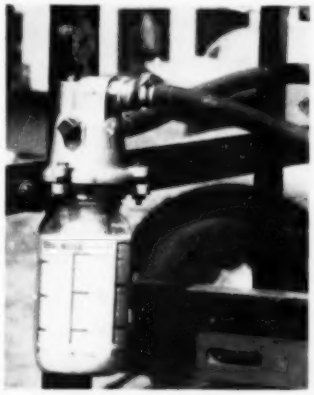
### Per Acre Guage Offered

The Mac Company, 10 South 12th St., Minneapolis 3, Minn., has marketed a spray-meter which calibrates the number of gallons per acre of given material as it is being applied. The guage can be attached to a tractor or other apparatus in full view of the operator to promote accuracy in application. Literature is available from the company. The photo shows guage attached to front of tractor in typical arrangement.



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### Hanson Booklet Offered

Howard Hanson & Co., Beloit, Wisconsin, have announced that full production is now in progress on their 1949 line of chemical spraying units and weed and insect pest control chemicals. The company's new facilities have three times the floor space formerly available for manufacturing. A new 40-page catalog and reference book is offered by the firm. The book contains definitions of weed control terminology, explains various 2,4-D formulations, spraying charts, DDT emulsion charts, and spraying instructions. It may be had by writing Howard Hanson & Co., Beloit, Wis.

The new line of equipment has been tested under actual field conditions, and the company reports that the units are superior to older models. Booms are made in various lengths of stainless steel with rustproof supports, fittings and attachments. The line includes one 35 ft. sulky boom for use on the prairie and in small grains. These machines will be exhibited at the South Dakota State Weed Control Conference, Brookings, S. D., March 15 and 16.

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### Utah State Bulletin

Utah State Agricultural College, Logan, Utah, has issued a recent bulletin picturing its teaching activities in the field of agricultural economics. The bulletin, dated November, 1948, presents figures on Utah's farm industries including the poultry industry, livestock, truck and fruit crops and extension. The bulletin is available upon request.

•

### Stauffer Catalog Out

Stauffer Chemical Co. has issued a new 108-page catalog which describes completely the entire Stauffer chemical line, giving properties, grades, analyses, principal uses, packing, shipping regulations, and stocks. Also included are various tables, dilution formulas, equivalents, general data for handy reference. Copies of the catalog are available from the firm's New York office, 420 Lexington Ave., New York 17.

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### Moves New York Office

Virginia Smelting Company has announced the removal of its offices to a new address: 270 Madison Ave., New York 16, N. Y. The telephone number is ORegon 9-1131.

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Special 25% DDT Emulsion Concentrate in Xylol

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### Chlordane

Chlordane—Technical
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40% Chlordane Wettable Dust Concentrate

### Toxaphene

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60% Toxaphene Water Miscible Concentrate

### Dinitro Ortho Cresol (DNOC)

DNOC—Technical

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## RODENTICIDES

Alpha Napthyl Thiourea (ANTU)

## MISCELLANEOUS ITEMS

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# Technical Briefs

### Peach Borer Control

DDT sprays for peach tree borer have been under test in orchards for three years at the New York Experiment Station at Geneva. Two or three applications during the summer when the young borers are hatching have given satisfactory control. Sprays containing DDT at concentrations of 2 to 3 pounds of the 50% wettable powder in 100 gallons of water are applied directly to the trunks, crotches, and limb bases of the tree. Spraying begins with the first hatch of borers early in July and is repeated at three-week intervals during the hatching period.

The use of DDT for peach tree borers should be regarded as a specific treatment for that particular pest, the station states. The DDT sprays will aid in combating other pests of peaches, but the spray applications should be timed for the borer. The treatment is entirely safe for young trees, even in the nursery, it is said. The DDT spray has one shortcoming in that it is not entirely effective against the so-called lesser peach tree borer and larvae of the regular borer which become established in wounds or deep burrows on the surface of the trunk.

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### Animal Toxicity Tests

Chlorinated camphene was found to be about four times as toxic as DDT when administered orally to various laboratory animals. The mean lethal dose of chlorinated camphene, when administered orally to laboratory animals, was about 60 mg. per kilogram. Preliminary tests indicate that livestock are of similar susceptibility. When applied to the skin it is also far more toxic than DDT. Although the insecticide is rather toxic from an acute standpoint, preliminary chronic-toxicity studies reported by the Food and Drug Administration indicate that for certain animals the insecticide taken in the diet in small doses over an extended period of time is not so toxic as certain other insecticides that are more toxic on the basis of single acute doses.

When 20 sheep, 15 goats, 8 cattle, 4 horses, and 4 hogs, all mature or nearly mature, were treated eight times at 4-day intervals with 1.5 percent of chlorinated camphene, no adverse effects were noted on any of the animals.

However, young calves are more susceptible to this insecticide. After reports of its toxic effect on calves in Texas, tests were made on calves 1 to 2 months old. A single spraying with 1.5-percent emulsion (containing xylene and kerosene) or wettable-powder suspension caused toxic symptoms on some of the treated calves, and two treatments 4 days apart caused a few deaths. Single treatments of 0.75-percent concentration had no adverse effects on 12 calves.

Milk samples from dairy herds treated four times at about monthly intervals with 0.5-percent wettable-powder sprays were analyzed for organic-chlorine content. Of 43 samples analyzed, 27 were negative. When the results were positive, the amounts of organic chlorine ranged from 0.2 to 0.6 p.p.m. It is not certain that the organic chlorine present can be attributed to the chlorinated camphene.

—*USDA Bulletin* E-752

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### Toxaphene & Corn Yield

County Agent J. L. King, St. George, S. C., reports that use of 10 pounds of toxaphene per acre more than doubled the production of corn in fields heavily-infested with corn ear-worm during the past season. Two fields of corn on the same farm, farmed and treated alike and both heavily infested in the bud, were involved in the test. The one receiving 10 pounds of toxaphene per acre produced only 36.3 bushels per acre. The agent stated further that although these fields were not adjacent, the corn earworm hatched out another generation and badly damaged the untreated field, while the treated field showed no further damage after being dusted.

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### Radioactive Tests

Experiments with certain low level radioactive materials during the 1948 crop year failed to show any beneficial effect upon either crop growth or quality, according to the U. S. Department of Agriculture. Tests were conducted on 18 crops in 14 states last year. They were the first to be made under a special 2-year study to be continued by the U.S.D.A. and cooperating agricultural experiment stations. The studies were undertaken in March of 1948 at the request of the Atomic Energy Commission which is financing the work.

Materials used to apply radioactivity were a commercial radioactive product and radium. The first of these was applied at three different rates, repeated ten times in the various field tests to insure dependable results. The other was applied in only one concentration, comparable to the medium concentration of the commercial material, but with the same replication.

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### Bees Tested for DDT

Bees in small cages were fed, sprayed, or dusted with various preparations of DDT and the resulting behavior and mortalities were observed.

Immediate tremors and greatly increased activity, followed by paralysis and death in which the victim usually lies on its side or back, are characteristic symptoms of DDT poisoning among caged bees. Some affected bees recover from light dosages.

Many bees were killed by 6 micrograms of DDT in sugar sirup when fed individually and by concentrations as low as 0.01 percent when fed collectively. Queen-cage candy containing 0.5 percent of DDT killed all bees to which it was fed. In pollen paste 5 percent of DDT was necessary to kill all bees.

Bees sprayed with DDT in xylene or water were immediately affected, and all died in less than a

day. DDT had no apparent fumigating effect on caged bees.

Residues on tin surfaces sprayed with 1 percent of DDT in water killed most of the bees exposed to them for 10 minutes or more. With 0.5-percent sprays mortality was greatly reduced, and 0.1-percent sprays were comparatively safe for bees. Concentration apparently was of more importance than quantity of spray applied and, within limits, than length of the exposure period.

DDT-water spray residues, although not repellent, were persistent in effect, a single application killing nearly all bees in five lots consecutively exposed to it.

Bees dusted with 10-percent DDT or placed in dusted cages were killed, and some cages retained sufficient DDT to kill bees placed in them later. The dust, however, was not so persistent as spray residues.

The bees removed DDT dust and talc from their bodies and also from their cages soon after dusting. Those dusted with 10-percent DDT died. Bees were not observed to clean dried spray residues from their cages.

Dusts containing 5 or 10 percent of DDT killed practically all bees that came in contact with them, whether the bees were dusted directly or only exposed to dusted surfaces. Dusts with 2.5 percent of DDT were less toxic, and those of lower strength usually had little effect.—*USDA Bulletin E-763 by A. W. Woodrow.*

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### Chlordane Stops Beetles

Successful use of chlordane in control of Japanese beetle has been reported by the U.S.D.A. Tests conducted with 40 soil types indicate that 10 pounds of chlordane per acre will control 98 percent of the grubs within a week and a half. The insecticide is more effective in warm weather, according to the tests, and late fall treatments did not kill all of the grubs until the following spring. At this rate of application in the soil, chlordane had no noticeable effect upon common grasses, spring rye-grass, soybeans, hybrid corn, evergreen nursery stock or most garden vegetables. The U.S.D.A. emphasizes that no recommendations have as yet been made for this type of application, but that tests thus far have been encouraging.

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### '49 Fertilizer Outlook

For the fiscal year 1948-49, the United States (including Hawaii and Puerto Rico) is expected again to have available more commercial fertilizer than in any previous year—over two and three-quarters times the average quantities used during prewar years. This is the tenth successive year in which new high records have been established. Compared with 1947-48 figures, as now revised, 1948-49 supplies will represent about 7% more nitrogen, 5% more phosphate, and about 10% more potash. It should be pointed out that these increases relate to the United States as a whole, and do not apply uniformly to all sections of the country.—(*USDA Fert. Outlook for* 1948-49)

## Chlordane – Tonic for Leafhoppers?

TESTS made during the summer of 1948, indicate that chlordane may have properties other than insecticidal, according to M. Curtis Wilson, Purdue University Agricultural Experiment Station, Lafayette, Indiana. In some cases, chlordane has apparently acted as a stimulant to certain insects, for instance, potato leafhoppers which were infesting alfalfa fields, he says.

Mr. Wilson's report states that large stands of alfalfa were treated with various insecticides, including both chlordane and DDT, in an attempt to increase seed production by controlling the insects, and that the outstanding pest in the field was the potato leafhopper, *Empoasca fabae* Harris. Each treatment was replicated four times using an Iron Age 50 gallon estate sprayer with a delivery rate of four gallons per minute. Accurate control was maintained so that chlordane was applied at the rate of one pound per acre and DDT at the rate of two pounds per acre. Data were taken one week and four weeks after treatment with an insect sweep net, twenty sweeps being made in each plot.

The effect of the various materials used became evident quickly. DDT controlled the leafhoppers and the plots took on a rich green foliage and heavy bloom. The reverse was true of chlordane, however. This material seemed to draw many potato leafhoppers into its plots. The plants, stunted and yellowed because of the heavy infestation, exhibited a sharp contrast with non-treated plots which were also seriously injured by the potato leafhopper. Even where randomization brought chlordane plots next to non-treated plots, the number of leafhoppers and amount of injury on the chlordane plots greatly surpassed that on the untreated plots. The following table indicates the rise in the potato leafhopper population on chlordane-treated plots one week and four weeks after treatment.

The table indicates that one week after treatment the potato leafhopper population increased on chlordane treated plots 140 percent or 2.4 times the untreated, and by the end of four weeks increased 213 percent or 3.1 times. The data also confirms the long residual effect of DDT against this insect.

Enough research has not been accomplished to explain this unusual result. There may be something in chlordane which acts as an attracting agent to the potato leafhopper, or there may be something in the material which affects the physiology of the alfalfa plant making it more attractive. The latter seems logical since this effect on potato leafhoppers has not been reported when chlordane was used on other plants.

**TABLE 1**
**Potato Leafhopper Population per 100 Sweeps**

| Treatment | One Week After Treatment | Four Weeks After Treatment |
|---|---|---|
| Untreated | 193 | 563 |
| Chlordane: 1 lb./acre | 463 | 1763 |
| DDT: 2 lb./acre | 6 | 31 |

# the Corporation President

## WHO ALMOST SLEPT TOO LONG

T. M. Stanton* was having a nightmare. For months he'd been preoccupied with the production problems of Empire Gadgets, Inc. So preoccupied, he'd even half-admitted to himself that he was devoting far less thought to national problems than a leading citizen should. But the urgency of his immediate interests kept shoving these concerns into his subconscious mind. Now they were torturing his sleep.

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Stanton's body lurched. "No!" he thundered. Awakened, he scratched his head, murmuring, "Gad, what a dream! H-m-m—wonder what sort of contribution I ought to be making . . ."

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# INDUSTRY NEWS

## N.E. Weed Meeting Held

A three-day meeting of the Northeastern Weed Control Conference was held at the Hotel New Yorker, New York City, on January 5, 6 and 7. The meeting, which will be reported in full in the February issue of *Agricultural Chemicals*, featured a number of sections dealing with different phases of chemical weed control.

DR. GILBERT AHLGREN

**New officers named at the meeting were: Dr. Robert D. Sweet, Cornell University, Ithaca, N.Y., president: Dr. H. L. Yowell, Esso Corp., Elizabeth, N.J., vice-president: and Dale E. Wolf, Rutgers University, New Brunswick, N.J., secretary-treasurer.**

**Dr. Sweet, formerly secretary-treasurer of the conference, succeeds Dr. Gilbert H. Ahlgren, Rutgers University as president.**

**Dr. Yowell succeeds Dr. B. H. Grigsby, Michigan State College. E. Lansing, Mich., as vice-president, and Mr. Wolf takes the position of secretary-treasurer vacated by Dr. Sweet.**

**The program committee for the meetting was composed of Dr. Benjamin Wolf, Seabrook Farms, Bridgeton, N.J., chairman: Dr. E. A. Prince, Maine Agricultural Experiment Station, Orono, Me. and T. R. Cox, American Cyanamid Co., New York. Advisors to the committee were Louis S. Evans, U.S.D.A., Beltsville, Md., Dale E. Wolf: and R. H. Beatty, American Chemical Paint Co.**

On the program were a number of speakers prominent in weed work. These included Dr. L. W. Kephart, U.S.D.A.; Charles Hamner, Michigan State College; C. H. Filman, Ontario Agricultural College, Guelph, Ontario; R. H. Beatty, American Chemical Paint Co., Ambler, Pa.; E. L. Barger, Iowa State College; and Keith Barrons, Dow Chemical Co., Midland, Mich.

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## Texas Entomologists Meet

The Texas Entomological Society is scheduled to meet at Waco, Texas on February 17 and 18. The program is expected to feature control of cotton insect pests, although formal announcement had not been received at press time.

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## Maneely Names Nolan SM

William J. Nolan has been appointed sales manager of the Maneely Chemical Co., Wheatland, Pa. The company, which was to open a new $500,000 plant in Wheatland on January 1, is a subsidiary of Wheatland Tube Co. The new plant will produce zinc chloride, zinc sulfate and ferric oxide.

The new sales manager has 27 years of experience in the chemical field.

**MEETINGS**

**Cotton States Branch, A.A.E.E.: Southern Weed Control Conference: Southern Agricultural Workers' Conference, Baton Rouge, La., Jan. 31, Feb. 1 & 2.**

**Western Weed Control Conference, Feb. 3 & 4, Bozeman, Mont.**

**California Mosquito Control Association Conference, jointly with American Mosquito Control Ass'n Berkeley and Oakland, Cal., Feb. 6-9, 1949.**

**California Weed Control Conference, February 16 & 17, Sacramento, Calif.**

**Texas Entomological Society Meeting, February 17 & 18, Waco, Texas.**

**South Dakota State Weed & Livestock Pest Control Conference, March 15 & 16 Aberdeen S.D.**

**Southern Shade Tree Conference, Thomas Hotel, Gainesville, Fla., March 23-25, 1949.**

**National Fertilizer Association, Greenbrier Hotel, White Sulphur Springs, W. Va., June 13-15.**

## Hitchcock Joins USI

U.S. Industrial Chemicals, Inc. has announced the appointment of Orville B. Hitchcock, Bozeman, Montana, as northwestern technical representative. Mr. Hitchcock was formerly assistant state entomologist of Montana.

ORVILLE B. HITCHCOCK

His new duties include providing technical assistance to firms in the use of "Pyrenone," USI product, and finding new uses and determining formulations for effective use of the product. His territory is part of the Pacific Coast Division, headed by R. E. Alexander with offices in Los Angeles. Mr. Hitchcock is a graduate of Colorado A. & M. College, and received his degree in entomology from Montana in 1939.

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## Calif. Weed Conference

The first annual California Weed Control Conference is scheduled to be held at Sacramento February 16 and 17, according to Walter S. Ball, California Department of Agriculture. The meeting will be divided into four main sections, according to the advance program.

These four sections will include one on research, one on extension, another on machinery, or application equipment: and the fourth on regulatory laws. A large hall is to

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be used for exhibition of numerous types of such equipment, including a helicopter. Mr. Ball stated that building rules would restrict the machinery to tractors, etc. with rubber tires.

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**Observes 3rd Anniversary**

Warren-Douglas Chemical Co., Omaha, Nebraska, recently observed its third anniversary with a sales meeting followed by a party given for its entire organization. The company, which manufactures industrial and agricultural chemicals, now has branch offices and warehouse facilities in Wichita, Kansas and Des Moines, Iowa, in addition to its Omaha office. President of Warren-Douglas is H. D. Warren. Other officers are: D. A. Douglas, vice-president; N. W. Boyer, secretary; Styrne Larson, Des Moines branch manager and A. R. Kuntzelman, manager of the Wichita Branch.

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**Builds New Office in L.A.**

Wilson & Geo. Meyer & Co., Pacific Coast distributors of agricultural and industrial chemicals, has announced beginning construction of a $150,000 warehouse and office building in Los Angeles. The new building will be headquarters for the company's service to customers in southern California, Utah, Colorado and New Mexico. Specifications for the new building call for 10,200 square feet of floor space, of which 3,000 will be used for offices.

President of the firm is Wilson Meyer, with headquarters in San Francisco. Southern California activities are supervised by Tom W. Harris, vice-president, and Tom H. Lathe is in charge of southwest agricultural chemical sales. Additional warehouses are maintained by the company in Portland, Oregon, and Seattle, Washington.

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**New Research Officers**

The Midwest Research Institute, Kansas City, Mo., has announced the appointment of Dr. George E. Ziegler as director and Dr. Clayton O. Dohrenwend as assistant director of the Institute.

Dr. Ziegler came to the Institute when it opened in 1945, and has been acting chief administrator of the Institute since the resignation of Howard Vagtborg six months ago.

Dr. Dohrenwend has been Research Consultant since coming to the Institute in July, 1946. He was formerly associated with Illinois Institute of Technology as Director of the Mechanics Department.

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**Midwest Shade Tree Conf.**

The fourth annual meeting of the Midwestern Chapter of the National Shade Tree Conference will be held February 17-18, at the LaSalle Hotel, Chicago. More than 300 members and guests are expected to be present when the meeting is called to order by President J. C. Carter.

The care of trees, shrubs and turf, will be discussed. A short question-and-answer period will follow the presentation of each paper; additional opportunity for questions and expression of opinion by those attending the meeting will be provided in the Plant Forum sessions.

## NAIDM Studies Fly Resistance to DDT

THE National Association of Insecticide & Disinfectant Manufacturers met at the Hotel New Yorker, New York City, December 6 and 7, the meeting closing with the re-election of Gordon Baird of Baird & McGuire, Inc., Holbrook, Mass., as president of the association for the coming year.

Featured at the meeting was an informal talk by Dr. E. F. Knipling, in charge of the Division of Insects Affecting Man and Animals, BEPQ, USDA, who reported on recent failures of DDT to give effective control of house flies. These failures of residual deposits of DDT to give the same excellent controls that were noted in initial applications three or four years ago were first noted in 1947 and were encountered in increasing numbers this year. Research was started promptly at the Orlando, Fla. station of the BEPQ to determine the cause.

It was found that in some cases the poor results resulted from failure to follow recommended application procedures, such as use of lower dosages than those suggested, failure to treat all fly resting places and failure to employ adequate sanitary measures to reduce fly breeding. The question of flies developing resistance to DDT was also investigated and some of the test work indicated that strains of DDT-resistant flies are developing, which require twenty to forty times the period of contact adequate for controlling non-resistant strains. Most failures, incidentally, were encountered at places where DDT had been applied for two or three years previous, and it seemed rather obvious that the ineffective control was connected directly with this prior use.

Pending further investigations, both in the laboratory and in the field, the Bureau's position for 1949 will be to continue to recommend DDT. Although it failed in many situations in 1948, it was also successful in many cases, and even where failures were noted, there was still a considerable reduction in fly populations. Recommendations for 1949 will stress the need for adequate strength sprays, proper application and better sanitation. It will be suggested also that chlordane and methoxychlor be considered as substitute or alternate treatments.

Another program topic which attracted considerable attention was an open forum on insecticide marketing presided over by Friar Thompson of R. J. Prentiss & Co. and John Powell of John Powell & Co. It was emphasized that the public has not been educated on how to use household insecticides, and that while there is abundant literature on how to use agricultural products effectively, no such promotional and educational job has been done with the household line.

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### Heads B. Birch Division

Beaumont Birch Co., Philadelphia, has announced the appointment of S. T. Transeau as head of its new Chemical Materials Handling Division.

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# Southern Weed Conference Set

THE program for the Southern Weed Conference to be held January 31 and February 1 and 2 at Baton Rouge, La., calls for discussions on numerous phases of chemical weed control. The meeting is to be held at the same time as the annual convention of Southern Agricultural Workers Association, and the Cotton States Branch of the American Association of Economic Entomologists.

The weed conference will open with a joint session with the Southeast Section of the American Society of Agricultural Engineers. The afternoon session will be in charge of G. M. Shear, Virginia Agricultural Experiment Station. Dr. H. W. Stoke, president of Louisiana State University will address the group, followed by W. E. Anderson, Louisiana Commissioner of Agriculture. Mr Anderson will describe the state's regulations on the use of herbicides. Other topics on the afternoon program are as follows: "The Role of Livestock in Dissemination of the Seed of Macartney Rose," by Wayne G. McCully, Texas A. & M.; "Control of Undesirable Hardwoods," by Henry Bull and Robert S. Campbell, U.S.D.A. forest service, New Orleans; "Chemical and Mechanical Methods of Eradicating Mesquite," by C. E. Fisher, Texas Agri. Experiment Station, Spur, Tex.

Floyd M. Cossitt, U.S.D.A. forest service, Atlanta, Ga., will talk on "The Use of Petroleum Products in Weeding Seedbeds of Southern Pines." C. A. Brown, W. M. Palmer and E. S. Hagood are authors of a paper entitled "Weed Control Studies in Forest Nurseries," to be presented at the meeting. "The Relation of Alligator Weed to Wildlife and Fisheries of the Gulf Coast," by J. J. Lynch, U.S.D.A. Fish and Wildlife Service, Abbeville, La.; and "Notes on the Eradication of Emergent Aquatic Vegetation with 2,4-D with Particular Emphasis on Alligator Weed," by J. H. Cornell, Bear Bluff Laboratory, Wadmalaw Island, S. C.

J. B. Edmond, Mississippi State College will be in charge of the session scheduled for February 1. Ten papers are on the program for that morning. They include: "2,4-D and Weeds in Strawberries," by W. F. Wilson, T. C. Ryker, and E. R. Stamper, all of Louisiana Agri. Experiment Station and E. I. DuPont de Nemours & Co., Inc.; "A Progress Report of Soil Treatments with 2,4-D," by L. L. Danielson, Virginia Truck Experiment Station; "Progress Report on Chemical Weed Control Experiments at Clemson, S. C.," by W. B. Albert, South Carolina Agricultural Experiment Station: "The use of 2,4-D as a Pre-emergence Treatment with Certain Vegetable Crops," by J. Mitchell Jenkins, Jr., Vegetable Research Laboratory, Wilmington, N. C.; "The Use of 2,4-D for the Control of Weeds in Gladioli and Daffodils," by L. Mitchell Jenkins, Jr., Vegetable Research Laboratory, Wilmington, N. C.

"Effects of Pre-emergence and Post-emergence Treatments of 2,4-D on Certain Vegetable Crops in 1948," by T. P. Hernandez and G. F. Warren, Louisiana Agricultural Experiment Station and Univ. of Wisconsin; "A Comparison of 2,4-D Pre-emergence Treatments on Onions from Seeds and Sets on a Peat Soil and Miami Silt Loam Soil," by T. P. Hernandez and G. F. Warren, Louisiana Agricultural Experiment Station and Univ. of Wisconsin; "Factors Affecting the Rate of Inactivation of 2,4-D in Peat Soil and the rate 2,4-D is Leached in Different Soils," by T. P. Hernandez and G. F. Warren, Louisiana Agricultural Experiment Station and Univ. of Wisconsin; "The Effect of Temperature on the Persistence of Sodium Pentachlorophenate in Soil," by A. J. Loustalot and R. Ferrer, U.S.D.A. Puerto Rico; and "Pre-emergence Control of Weeds," by O. A. Leonard, Miss. Agricultural Experiment Station.

The afternoon session of February 1, in charge of A. J. Loustalot, U.S.D.A., Puerto Rico, will see a continuation of papers on the subject. These will be entitled: "Chlorates in Johnson Grass Control," by Leon Godchaux III, Godchaux Sugars, Inc., New Orleans, La.; "Studies on Chemical Control of *Cyperus rotundus*," by L. E. Cowart, T. C. Ryker, and L. E. Creasey, Louisiana Agricultural Experiment Station and E. I. DuPont de Nemours & Co., Inc.; "Salts of Trichloroacetic Acid for the Control of Johnson Grass," by T. C. Ryker and S. J. P. Chilton, E. I. DuPont de Nemours & Co., Inc., and Louisiana Agricultural Experiment Station; "Comparative Studies on Effect of Chemicals on Control of Seedlings of Johnson Grass and other Grasses," by E. S. Hagood and E. R. Stamper, Louisiana Agricultural Experiment Station; "Experiments with Ammonium and Sodium Trichloroacetates for the Control of Johnson Grass and Bermuda Grass in Georgia," by Edward P. Carter, U.S.D.A. Experiment, Georgia; "2,4-D Flaming and Johnson Grass Seedlings," by E. R. Stamper and S. J. P. Chilton, Louisiana Agricultural Experiment Station; "Seed Populations of Johnson Grass in Louisiana Cane Areas," by Ruth P. Phillips and S. J. P. Chilton, Louisiana State University; "Recent Developments in the Control of Weeds in Sugar Cane Under Louisiana Conditions," by George Arceneaux and Leo P. Hebert, U.S.D.A., Houma, La.; "Spraying Losses," by J. M. DallaValle and O. E. Sell, Georgia School of Technology Engineering Experiment Station and Georgia Experiment Station; and "Studies on the relation of Mineral Elements to the effect of 2,4-D on Rice," by M. Ishaque, Louisiana State University.

On the final day, the morning session is to be in charge of H. T. Rogers, Alabama Agricultural Experiment Station. A total of eight papers are on the program. These are: "Wild Garlic Control—A Progress Report," by O. E. Sell and J. M. DallaValle, Georgia Agricultural Experiment Station and Georgia Tech. Eng. Experiment Station; "Weed Control in

Corn with 2,4-D," by G. M. Shear; "Weed Control in Corn," by G. C. Klingman, N. C. State College; "2,4-D and Rumex in Oats," by T. C. Ryker and L. E. Cowart; "Studies on Weed Control in Cotton," by L. E. Cowart, C. A. Brown, E. R. Stamper, and L. E. Creasey, Louisiana Agricultural Experiment Station; "Effect of Chemical Pre-emergence Weed Control Treatments on Stand of Weeds and Stands and Yields of Peanuts," by J. M. Scholl and V. S. Searcy, Alabama Agricultural Experiment Station. "Herbicide Applications to Seedlings and Established Alfalfa for Weed and Disease Control," by H. W. Johnson, R. B. Carr and O. A. Leonard, U.S.D.A. and Mississippi Agricultural Experiment Station; and "Broadleaf Weeds in Rice and 2,4-D," by T. C. Ryker.

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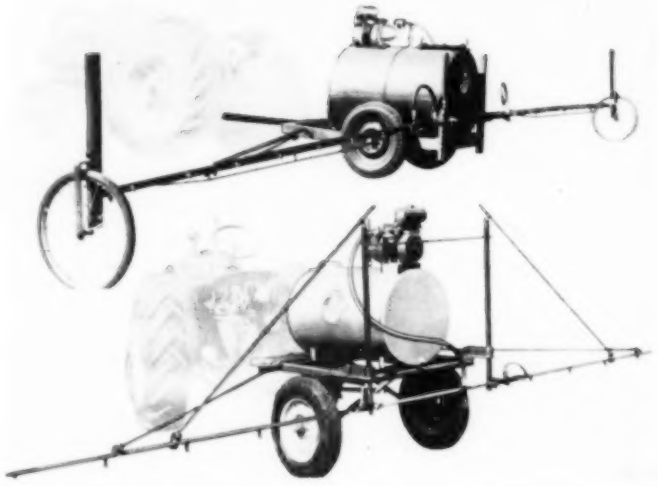
## Powell to Magazine Field

John Powell, president of the New York firm bearing his name, resigned as of January 1, and has announced the sale of his interest in the company to three associates who have assumed full control. The new owners are William J. Pollert, H. Alvin Smith and Dr. Alfred Weed. Mr. Powell had been associated with the firm since its founding in 1923. He was associated with the insecticide and botanical drug industries for over thirty years, being formerly connected with J. L. Hopkins & Co., and Arthur Stallman Co.

At a testimonial farewell dinner tendered by the company to Mr. Powell at the Hotel Vanderbilt, New York, 200 friends and associates saw him presented with a Pan American World Airways ticket for a trip around the world and a scroll signed by all those present. Mr. Powell announced his plans to enter the publishing field with a new monthly magazine, *Modern Sanitation*, designed to cover the sanitation interests and problems of the industrial and institutional fields. Offices of the new publication are at 855 Avenue of the Americas, New York.

H. Alvin Smith, executive vice president of John Powell & Co., in tracing the history of the company, pointed out that Dr. Weed and Mr. Pollert had been associated with the management each for twenty years and that no changes in the policies or in the personnel of the organization were contemplated at the present time.

## 1949 Sprayers Offered by Howard Hanson Co.



(Above) 230 gallon self-contained unit with 35-foot "Resisto-Rust" sulky boom. (lower photo) 100 gallon self-contained Hanson sprayer unit mounted on "Hi-X" trailer for row crop clearance. Full details on page 51, this issue.

Thompson-Hayward Chemical Co., Kansas City, recently held a three -day meeting attended by more than 90 salesmen from the firm's 18 branch offices and warehouses throughout the country. Above is the group pictured during the sessions at Kansas City. The company is a basic distributor of agricultural chemicals, and also a manufacturer of agricultural and specialty products under its own trade name. Sales volume for 1948 was expected to exceed that of the previous year by more than 12 million dollars, the company has announced.

# California County Agricultural Commissioners Meet

**By Dr. Alvin J. Cox**

DISCUSSIONS covering "Pest-plant Control" and "New Insect Pest Control materials and Techniques" were featured at the fall meeting of the State of California Association of County Agricultural Commissioners held at the County Court House, Sacramento on December 8 and 9.

W. C. Jacobsen, assistant to the Director of Agriculture, led the discussion of the first afternoon's topic, Pest-Plant Control. In presenting the general problem, he called attention to the earlier developed "Compound 1080" and to DDT with its numerous analogs and subsequent products developed through research programs in connection with World War II. Simplified nomenclature has been a great deal of help, he said. In the rush, there has been too little attention paid to the question of hazard. There are many sources of information but some users have been misled by accepting hearsay instructions instead of consulting labels and published facts.

Dr. Herbert Abrams, Chief, Bureau of Adult Health, State of California Dept. of Public Health, San Francisco, discussed "Human Hazards from New Pest Control Materials." He pointed out that fifty years ago, people in the country were healthier than those in the city. Health in the cities has since improved and now persons in each environment enjoy about the same degree of health. A farm is a factory in the field and no agricultural crop is produced without one or more chemical adjuncts. He said that the public health values of these products far outweigh the public health hazards. These materials can and should be used with safety. All can be employed with safety when suitable precautions are used. The pressing need is for education. The job is to inform the people; not to alarm them.

The State of California Bureau of Chemistry has always been zealous to safeguard against any hazard of agricultural chemicals. Allen B. Lemmon, Chief of the Bureau, stated that the labels of new economic poisons have improved and now comply with California law. It's hard to compute chronic toxicity, but the Bureau tries to be reasonable, he said. If a product is without residue it is probably acceptable, but otherwise new organic compounds are not accepted for application where there would be a spray or dust residue hazard when used as directed.

Dr. William S. Stewart, Assistant Plant Pathologist, University of California, Riverside, spoke on the "Use of Spray Growth Regulators and Defoliants." Naphthalene acetic acid, one part per million, is a good abscission preventer and when applied three weeks in advance has given a satisfactory reduction in drop of apples. However, if fruit is held on the tree beyond normal harvest time its keeping qualities are impaired. He illustrated the minute quantity needed by pointing out that 1 p.p.m. is one inch in 16 miles. Naphthalene acetic acid does not affect citrus but 8 p.p.m. of 2,4-D afforded 60% reduction in drop. The sprayed trees also showed a reduction in fruit-stem die-back: 2,4,5-T was even more effective. Citrus has three flush growths per year, and application is made between these.

Capt. Murray R. Pryor, Supervisor of Weed Control, State of California Department of Agriculture, Sacramento, presented a paper entitled "Future of 2,4-D and Other Developments in New Herbicides." He spoke of the selectivity of 2,4-D for grass families and its intrinsic value in spite of some injury to cotton and grapes in the State. Its potential use on cereal crops is very great, he pointed out. 2,4,5-T acid is less selective but does a better job on blackberries. 2,4-D does a better job on Klamath weed.

During the morning of the second day four subjects were presented under "New Insect Pest Control Materials and Techniques," with Allen B. Lemmon as leader.

Dr. David T. Prendergast, President, Pacific Insecticide Institute read a paper entitled, "Problems of the Insecticide Industry." He stated that the problem of safe use of agricultural chemicals is the same for new as well as old products. The old products came in slowly; investigators had sufficient opportunity to study their action, and the public readily became familiar with their handling, dosage, toxicity and proper use.

In recent years investigators have turned their attention to the unexplored field of organic chemistry in an attempt to develop more efficient, less toxic, more economical and less phytotoxic materials. The development of organic fungicides, insecticides, herbicides, rodenticides, fumigants and seed disinfectants has been the direct result of painstaking research by Federal and State agencies and by industry; most of it in close cooperation by those concerned.

Dr. Guy F. MacLeod, Technical Director, Sunland Industries,

### California's System of "County Commissioners"

**The County Agricultural Commissioner is a regulatory officer, paid by his respective county. He is in charge of enforcement of pest control measures and certain other provisions of the State Agricultural Code. The assignment of agricultural regulatory work to an officer at the county level is peculiar to the State of California. This practice dates back to 1881, making agricultural pest control by abatement a strictly local function. In other matters, the commissioners operate under the supervision and direction of the State Department of Agriculture.**

**There are 51 agricultural commissioners at the present time, out of 58 counties in the State. In counties which do not have agricultural commissioners, the State Director of Agriculture may act in that capacity.**

**The commissioners hold two open meetings annually. The program of the Spring meeting is arranged by the Association, and that of the Fall meeting is prepared by the State Department of Agriculture to bring the commissioners up to date on the numerous phases of their work.**

## 1949 Cotton Pest Control Recommendations

RECOMMENDATIONS for '49 were made at the second annual Cotton Insect Control Conference held at Atlanta December 6 & 7. The meeting was held under sponsorship of the National Cotton Council.

Dr. R. W. Harned, in charge of the division of cotton insects, U.S.D.A. Bureau of Entomology and Plant Quarantine, made the recommendations which had been prepared at the November meeting of federal and state entomologists at Baton Rouge, La.

A summary of insecticides and their use for control of cotton insects follows:

BENZENE HEXACHLORIDE, though controlling numerous cotton pests, does not control bollworm and red spider mites which often increase in numbers after use of BHC. However, BHC at one-third pound gamma isomer per acre (example: 10 lbs. BHC dust containing 3 percent gamma isomer) is minimum effective rate. The most common dust formulation contains 3 percent gamma isomer and 5 percent DDT. In areas where red spider mites are a problem, 40 percent sulfur should be used in the mixture. Sulfur, pyrophyllite and non-alkaline clays and talcs have been used as diluents.

CALCIUM ARSENATE at 7 to 10 lbs. per acre will control the boll weevil and cotton leafworm. At 12 to 16 lbs. per acre it will control the bollworm with proper timing and if infestation is not too heavy. When used for control of cotton fleahopper, tarnished plant bug and rapid plant bug, a mixture of two-thirds sulfur and one-third calcium arsenate should be used at 16 lbs. per acre. Livestock should be kept out of dusted fields, and drift should be avoided.

CHLORDANE is effective against fleahopper, tarnished plant bug, grasshoppers and thrips. Ten percent chlordane dust controlled grasshoppers in Texas pastures adjacent to cotton fields. From 0.5 to 1.0 pound of technical material (example: 5 to 10 lbs. of 10 percent chlordane dust) per acre are required for control of susceptible insects. Results against weevils in squares and bolls were conflicting, and variable against boll weevils. However, when 5 percent DDT was added, good bollworm control resulted; and when 40 percent sulfur was added to the DDT-chlordane combination, red spider mite infestations did not develop. Toxicity of chlordane is about the same as DDT.

CHLORINATED CAMPHENE at two lbs. per acre of the technical material (10 lbs. of 20 percent dust) will control boll weevil, bollworm, fall armyworm, cotton fleahopper, thrips, cotton leafworm and grasshoppers. Cotton fleahopper and thrips, however, may be controlled with 1.0 pound of technical grade per acre. Cotton aphids were "suppressed where the material was used throughout the season, but it did not "knock out" heavy infestations. Non-alkaline diluents are suitable carriers for chlorinated camphene. The toxicant should be handled as a poison and kept away from food and feed.

DDT was generally used as a dust for cotton insect control at concentrations of not less than 5 percent or more than 10 percent either alone or with other insecticides, and at rates of 10 to 15 lbs. per acre. The higher rate of application is required for control of bollworm and pink bollworm, but the lower rates will control cotton fleahopper, tarnished plant bug, rapid plant bug and thrips. DDT was not effective against boll weevil, cotton leafworm, red spider mites, cotton aphid and grasshoppers.

DILUENTS, SOLVENTS AND ACCESSORY MATERIALS. Erratic results and poor control of insects is attributed by research workers to inferior dusting qualities. Need for criteria for suitable organic dust mixtures. This might include flowability, adherence, density and particle size. More information is needed on stickers, carriers, solvents, emulsifiers and dispersing agents. Sulfur is recommended for use in those areas where red spider mites are a problem, although physically, it is not the most desirable diluent.

DINITRO COMPOUNDS when tested in the laboratory against red spider mite were effective, at ½ percent dust at the rate of 10 lbs. per acre. Results with dinitro-cyclohexylphenol in the field were frequently unsatisfactory, perhaps because of poor dusting qualities and poor plant coverage.

DITOLYL TRICHLOROETHANE was used against cotton insects in laboratory and cage tests only. It was less effective than DDT against cotton fleahopper. Dust concentrations of 5 to 20 percent were ineffective against the boll weevil, bollworm, cotton aphid and garden webworm.

HEPTACHLOR, a chlorinated hydrocarbon related to chlordane, has been tested against several species of cotton pests in laboratory and cage tests and in limited field experiments. In the former, concentrations as low as 1.25 percent were effective. Effectiveness tends to be reduced when temperature is high. The material is said to be highly toxic to warm-blooded animals, and extreme precautions must be followed when experimenting.

METHOXYCHLOR as a 5 percent dust was effective against cotton fleahopper, but slightly less effective than DDT. Dusts containing 10 percent methoxychlor controlled cotton leafworm, but lower dosages gave poor control. A combination dust containing 10 percent methoxychlor, 2 percent gamma BHC and 40 percent sulfur applied at 15 lbs. per acre gave fairly good boll weevil control, but failed to control the bollworm.

NICOTINE at either two or three percent in a suitable carrier can be used to "knock out" heavy aphid infestations. At least 0.2 of a pound per acre of free nicotine equivalent should be applied. The source may be either nicotine sulfate or a fixed nicotine in dust form.

PARATHION dust at 1 percent is effective against cotton aphid, red spider mite, garden webworm and some species of thrips. Two percent dust was effective against grasshoppers and fall armyworm. Toxicity data do not justify including parathion in control recommendations for cotton insects in 1949, although residues on plants do not persist more than a month.

PIPERONYL COMPOUNDS were not effective against cotton aphids when applied alone as a dust in concentrations ranging from 0.125 to 4 percent. Neither piperonyl cyclonene or piperonyl butoxide caused any increase in the effectiveness of chlorinated camphene, chlordane, BHC, DDT or Ryania against cotton aphids when mixed with these materials at 2 percent concentration. A dust mixture containing 0.25 percent rotenone and 1 percent piperonyl cyclonene appeared about equal to 1 percent rotenone against aphids.

ROTENONE, PYRETHRUM, RYANIA AND SABADILLA. There appears to be little reason for recommending these materials for control of cotton insects since some of the newer organics are more readily available, cheaper, and effective.

SULFUR has been widely used on cotton for control of red spider mites and cotton fleahopper. Forty percent or more sulfur should be included in organic insecticides used on cotton to prevent infestation of red spider mites in areas where they are likely to occur.

DDD has been tested against cotton insects only in laboratory and cages. Used as a 20 percent dust, it killed the boll weevil and bollworm but was less effective when applied as a 10 percent dust. It was slightly less effective than DDT against cotton fleahopper.

TETRAETHYL PYROPHOSPHATE showed promise as an aphicide on cotton in tests, and is an effective miticide. It deteriorates rapidly in moist air and is incompatible with alkaline materials. The material is not recommended for cotton insect control for 1949.

INSECTICIDAL SPRAYS are not recommended for control of cotton insects for 1949. Tests made during the past year were promising, however, and more research is under way.

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## Dow Appoints Grant in NY

The appointment of Leo B. Grant as manager of the New York sales office of Dow Chemical Company has been announced. Mr. Grant succeeds the late Ralph E. Dorland who had held the position from 1919 until his death in May, 1948.

The new manager was associated with Dow's magnesium division in Midland, for 20 years before joining the executive staff in New York.

# News From the Fertilizer Industry

### Fertilizer by 'Copter

Cranberry growers in New England are considering the use of helicopters for applying commercial fertilizer to their bogs, according to Dr. F. B. Chandler, Research Professor of Cranberry Culture at East Wareham, Mass. Trials during the past season show this method to be feasible, provided the fertilizer can first be put into granules of equal size and weight. At present, it was pointed out, the usual formulations have varying sized-particles of different specific gravities which give poor distribution from the air. Heavier particles are thrown farther than the lighter ones.

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### Fertilizer Salesmen Meet

One hundred fertilizer salesmen representing the fertilizer industry of Mississippi met for a one day short course on the Mississippi State College campus December 17. Dennis Granberry, Laurel Oil & Fertilizer Co., Laurel, Miss., told the group that in his opinion "The nitrate situation will be remedied materially within 12 or 14 months." He pointed out the expansion of many existing plants throughout the country, and the construction of numerous new ones, to back up his statement. Other speakers stated that farmers of Mississippi are using about one-third of the fertilizer which should be used on crop land, not to mention the 5,000,000 acres of land not now under cultivation.

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### Carvel Inaugurated in Del.

Elbert N. Carvel, president of the Valhant Fertilizer Company, Laurel, Delaware, was to be inaugurated as Governor of the State of Delaware in a public ceremony January 18, at Dover. Mr. Carvel, was Lt. Governor of the State since 1945.

The new Governor is well known in agricultural circles not only in his own state, but in other areas.

GOV. E. N. CARVEL

He is a member of the Board of Directors of the National Fertilizer Association, a director of the Sussex Trust Co., Laurel; was vice-president of the Delmarva Peninsula Fertilizer Association last year; is a member of the Plant Food Research Committee of the National Joint Committee on Fertilizer Application; is a trustee of the University of Delaware; operates three farms in Maryland and Delaware; and is active in a number of clubs. He is a native of Shelter Island Hts., New York, and a graduate of the University of Baltimore and Baltimore Polytechnic Institute.

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### Big Sulfuric Acid Plant

The largest single unit sulfur-burning contact sulfuric acid plant ever built was placed in operation on December 14 at the Standard Wholesale Phosphate and Acid Works in Baltimore, Md. The new unit, capable of producing more than 500 tons of sulfuric acid per day, was built by Chemical Construction Corp., a unit of American Cyanamid Co.

**At press time it was announced that Mathieson Chemical Corp., New York, would purchase Standard Wholesale Phosphate & Acid Works for $8,700,000. Early in January it was reported that 90 percent of Standard's stockholders had approved the sale. Mathieson had stipulated that two-thirds of Standard's stock must accept the proposition.**

## Potash Institute Names Dr. H. B. Mann

DR. H. B. MANN

DR. J. W. TURRENTINE

Dr. Harvey B. Mann became president and a director of the American Potash Institute, Washington, D. C., on January 1, to succeed Dr. J. W. Turrentine who has been at the head of the Institute since its founding in 1935. Dr. Turrentine will continue to serve the Institute in the capacity of a consultant with the title of president emeritus.

The new president, a native of North Carolina, was formerly vice-president of the Institute. He is a graduate of N. Carolina State College, and holds a Ph.D. degree from Cornell University. He was a member of the North Carolina Experiment Station staff for a number of years, serving as an agronomist in soil fertility work. Joining the Institute in 1936, he became manager of its southern territory and was named vice-president in January, 1948. Dr. Mann is well known in numerous agricultural circles through his past associations with land grant colleges and scientific organizations throughout the United States.

### Bemis Advances Braxtan

Bemis Bro. Bag Co., St. Louis, Mo., has announced the appointment of John T. Braxtan as office manager of its Minneapolis plant. He was

JOHN T. BRAXTAN

formerly with the company's general offices in St. Louis as supervisor of burlap sales.

The new appointee is a graduate of the Harvard Business School, joined Bemis in 1934, and in 1941 was placed in charge of the Market Research Department. During World War II, he served as a Lt. Commander in the Navy. Upon returning to Bemis, he worked on a number of special assignments before being put in supervision of burlap sales. At press time, Mr. Braxtan's successor at the general offices had not been announced.

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### Fertilizer Sales Up

An increase of 9 percent in fertilizer tax tag sales was reported in the 14 States in which these tags are required, for the first 11 months of 1948, according to the National Fertilizer Association. The figures were 8,483,000 short tons for Jan. to Nov., 1948 compared to 7,756,000 tons reported for the same period of 1947. In 1946 and 1947, January-November sales accounted for 90 percent of annual sales; if that same ratio continued for the full year, 1948, total sales for the year would have totaled over 9,400,000 short tons.

Total sales in the 14 states for the first five months of the fiscal year (July-November) amounted to 2,363,000 short tons, a slight increase over the same period of 1947. This increase was noted in both the southern and midwestern states reporting.

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### Extra Gain via Fertilizer

Coke Oven Ammonia Research Bureau, Columbus, Ohio, has issued its publication "Nitrogen News and Views" for November-December in which is described increases in yield of winter grains through fertilization. Complete fertilizer application at planting time (4-12-8) plus a spring application of nitrogen brought the greatest increase. Check plots of barley, for instance, yielded 16.8 bushels per acre, where a similar plot, receiving 500 pounds of 4-12-8 at planting time and 32 pounds of nitrogen in March, yielded 35.1 bushels per acre. From an economic standpoint, the two treatments gave a return of $32.87 per acre, according to the publication.

### Michigan Conference Held

The annual meeting of the Michigan Insecticide, Fungicide Institute was to be held January 11 and 12 at the Fairchild Theatre on the campus of Michigan State College, E. Lansing. Subjects to be discussed included livestock insect control, plant diseases, weed control, and general pest control measures.

Speakers named on the advanced program included Dr. Ray L. Janes, R. W. Tenney, Dr. B. H. Grigsby, A. E. Mitchell, Dr. Herman King, Dr. William B. Drew, Prof. Ray Hutson and Dr. Edward Andrews, all of Michigan State College; John C. Dunegan, U.S.D.A.; W. E. Greagley, chief chemist, Michigan Department of Agriculture; and other entomologists, plant pathologists and fruit dealers and handlers.

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### Attaclay Appoints Cole

Attapulgus Clay Co., Philadelphia, has announced the appointment of Irving A. Cole as manager of the Technical Division. He assumed his duties in November, at the company's laboratories at Camden, N. J. Mr. Cole was engaged previously in the sales department where he specialized in the technical aspects in the development of new fullers earth and bauxite products. He is a graduate of Cornell University.

## CALIF. MEETING

(*Continued from Page 66A*)

Inc., Fresno, discussed what the manufacturer can do to be more helpful in getting economic poisons information out to salesmen. Much can be done at higher levels in the industry. There is strong competition in industry and between government research and industry for highly trained men. The problem of training field men is one of economics. The industry is just as anxious as the officials to get out of the field men who sell a material on false pretenses. We need a revision of research on agricultural chemicals so that we will advance all pertinent fields of knowledge simultaneously, he declared.

Dr. Stanley Freeborn, Assistant Dean, College of Agriculture, Berkeley, spoke on the subject: "Research Results Should Precede Use of New Insecticides." Nicotine and cyanide are much more poisonous than the new insecticides, he reminded, so it is difficult to determine the cause of hysteria about the new insecticides.

Dr. Freeborn pointed out that when the first steam train was operated, an employee had to go ahead and wave a red flag. We have long since learned to live with trains. The trouble with new economic poisons is that they have just come too fast. If a tolerance is established the product is stigmatized, if not, health authorities may condemn its sale.

Arthur D. Borden, Entomologist in the California Agricultural Experiment Station, Berkeley, discussed "Deciduous Fruit Pest Insecticides." He said that the introduction of so many new products has made many problems for the field entomologists. They have to test many products on experimental plots and frequently in several counties. They must determine:

1. **The active ingredient**
2. **The insects against which it is effective**
3. **A reasonable dosage**
4. **Injury to tree and fruit**
5. **Hazard to sprayer**
6. **Deposit, timing, and if it leaves residue hazard**
7. **Compatability with other spray materials**
8. **The effect on the biological balance**
9. **Formulations for different methods of application**
10. **Effect on cover crops**
11. **Accumulation of material in the soil**
12. **The cost of material per acre.**

## HETP AEROSOLS

(*Continued from Page 38*)

or 20-percent aerosols. The maximum diameter of particles also increased with the more concentrated solutions.

Heating the aerosol solutions decreased the average particle size for all concentrations.

The size of the particles from an aerosol at a pressure of 150 pounds per square inch was the same whether the pressure was attained by heating or by introducing carbon dioxide. Thus pressure rather than heat is responsible for the decreased particle size.

In kill of mites or aphids no consistent difference was found between heated and unheated solutions where the same quantity of aerosol was released in a greenhouse.

In a study on phytotoxicity, injury to the tomato variety Italian Salad was associated with aerosol particles 20 microns or more in diameter. On the basis of these studies the most dilute aerosols, which produced the finest particles, give the most efficient pest control and the least plant injury. Heating the more concentrated aerosols or increasing the pressure with carbon dioxide does not eliminate the larger particles responsible for plant injury.★★

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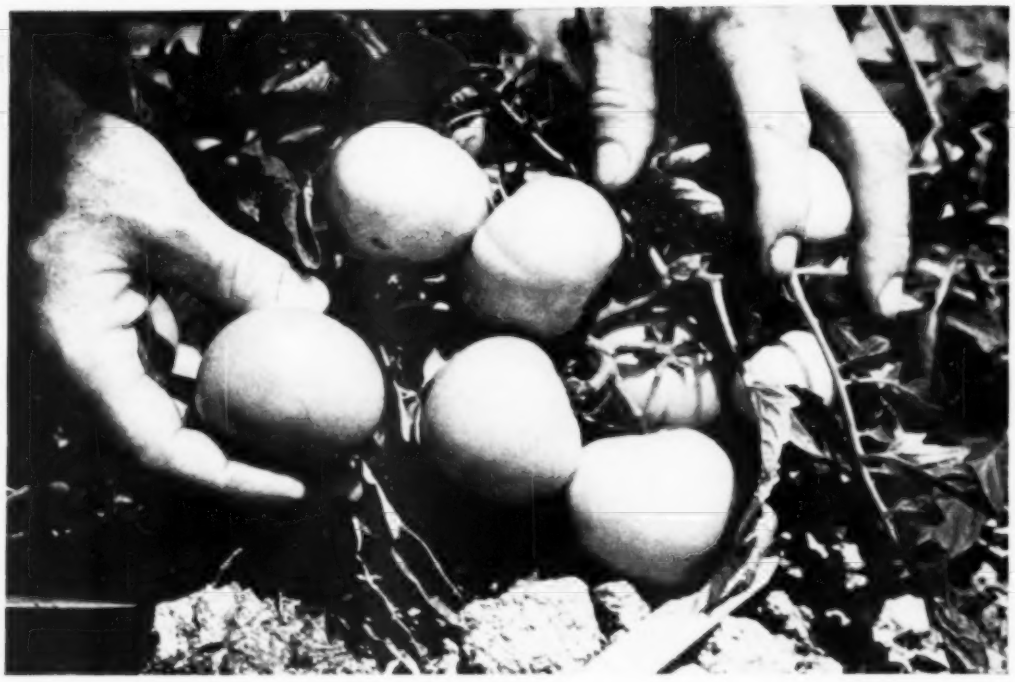
**TABLE 6**

**Toxicity of 10-percent hexaethyl tetraphosphate[1] aerosol to spider mites and to tomato plants exposed at different intervals after release.**

| Minutes after release | Mortality of mites, percent | Tomato injury |
|---|---|---|
| 0 to 5 | 97 | Scattered necrotic spots |
| 0 to 15 | 98 | Severe necrotic spots—leaf yellowing |
| 0 to 30 | 97 | |
| 0 to 60 | 98 | More severe necrotic injury to young leaves than 0 to 30 |
| 5 to 60 | 97 | |
| 15 to 60 | 93 | No detachable injury |
| 30 to 60 | 98 | |

[1] 12.3 percent tetraethyl pyrophosphate.



# Tomatoes love PARZATE

**The tomato** has had a hard time recently. Its life has been blighted . . . by early blight, late blight and leaf spots.

Many products have been used for control of tomato blights. But often the cure has been as bad as the disease.

Now Du Pont has come close to the ideal fungicide . . . ideal for tomatoes, potatoes, celery and many other vegetables. This new product is "Parzate." "Parzate" is highly effective against diseases, yet harmless to the plants themselves. In fact, many growers who use "Parzate" say it stimulates healthier, greener foliage and gives better yields. In test plots you can readily see this contrast.

• • •

***"PARZATE"** is just one of many outstanding products of Du Pont research and testing. You can get full information on Du Pont farm chemicals from your local Du Pont technical representative. Or write to Du Pont, Grasselli Chemicals Dept., Wilmington 98, Delaware.*

***DU PONT CHEMICALS FOR THE FARM INCLUDE:***

**PARZATE®, FERMATE® and ZERLATE® Fungicides; Copper-A, Fixed Copper; DEENATE® DDT and MARLATE® Insecticides; AMMATE® and 2,4-D Weed Killers; LEXONE® (benzene hexachloride); KRENITE® Dinitro Spray; LORO®; SULFORON® and SULFORON®-X Wettable Sulfurs; Du Pont Spreader-Sticker; Spray Adhesive; Du Pont Cotton Dusts; PARMONE® Fruit Drop Inhibitor, and many others.**

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...THROUGH CHEMISTRY

## LISTENING POST

(*Continued from Page 49*)

green stink bug, harlequin bug, and flea beetles.

During the first half of December the green peach aphid and cabbage looper were reported injuring spinach in Virginia. Cutworms, webworms, and slugs were present on that crop in South Carolina. Lettuce and carrots in South Carolina were being attacked by Lygus bugs. In Florida, cutworms, armyworms, and the serpentine leaf miner were damaging tomatoes. The onion thrips were infesting onions severely in Louisiana and were present in sufficient numbers to warrant insecticide applications in some fields in the lower Rio Grande Valley of Texas. In the latter area an unusually destructive infestation of young armyworms was found in a large field of newly emerging onions about the middle of the month.

### Chlordane Versus Grubs

EXPERIMENTS conducted at the Moorestown, N. J. laboratory of the Bureau of Entomology and Plant Quarantine has shown chlordane to be very effective for control of Japanese beetle grubs in lawn and other turf areas. It kills the grubs faster than either DDT or lead arsenate, and one treatment will remain effective for at least two years. Just how long this material will continue to kill remains to be determined. At the recommended rate, DDT has continued to be effective for about five years.

In tests with 40 different soil types, 10 pounds of chlordane per acre has been found to kill 98 percent of the Japanese beetle grubs within a week and a half at summer temperatures. Treatments applied late in the fall did not kill all of the grubs until the following spring, as the material acts more slowly in cooler weather.

### Seek Other Fly Controls

AN intensified search for potential substitute materials which might be considered to replace DDT for fly control is under way by the Bureau of Entomology and Plant Quarantine. Several of the materials tested continue to kill flies and mosquitoes for as long as several weeks or months. Against normal laboratory strains of houseflies, methoxychlor, an analog of DDT, is the most effective and long-lasting of the materials tried thus far. It compares favorably with DDT. Other compounds showing promise are chlordane and benzene hexachloride. The performance of these insecticides against strains of flies resistant to DDT is being studied and some are indicated to be superior to DDT.

## NORTH CENTRAL WEEDS

(*Continued from Page 34*)

found that 2, 4, 5-T was effective in control of buckbrush and snowberry, which are tolerant to 2, 4-D foliage sprays, but that higher concentrations of 2, 4-D will kill the plant. No effort was made in 1948 to combine

2,4-D and 2, 4, 5-T to control these plants, but such an experiment will be forthcoming in 1949. Attempts to control Osage Orange have been difficult with 2, 4-D, and reports of the effect of 2, 4, 5-T on it have been conflicting. There is evidence, however, that the latter will kill under certain conditions. One report indicated that using a combination of 2, 4-D and 2, 4, 5-T at 3,000 ppm kills Osage Orange in all stages of growth, when used as a foliage spray. This was regarded as an indication of possible synergistic action of the two.

A general session on Thursday morning, under the joint chairmanship of George Knowles, Central Experimental Farms, Ottawa, Canada; and G. H. Leeson, was divided into two sections. The first dealt with perennial and annual weeds. Mr. Knowles presented data pertaining to the control of perennial weeds, pointing out that in previous classifications, plants were grouped as "susceptible" to 2,4-D, "intermediate," and "resistant." The intermediate group, he said had become a catch-all for those plants which are not easily killed, or those that showed little or no response. Indications now are that the stage of growth at the time of treatment and the amount of 2,4-D applied may determine the end result. He then mentioned a comprehensive list of perennials which he classified in four groups: "very sensitive," "sensitive," "semi-resistant," and "resistant." The first category included plants which may be controlled at their most susceptible stage of growth by one application of ½ pound or less of 2,4-D acid per acre. The second included any perennial plant that is controlled at its most susceptible stage of growth by one application of from ½ to one pound of 2,4-D acid per acre. The semi-resistant variety includes those controlled by one application of up to 2 pounds per acre, and resistant plants are those which are not controlled at any stage of growth by repeated applications of up to 2 pounds of 2,4-D acid per acre.

Other speakers on this portion of the program included Len Weigand, Willmar, Minn., who reviewed one season's work in control of perennial weeds; and W. M. Phillips, Hays, Kansas, "Control of Annual weeds in Winter Wheat."

Reports on educational and action programs were in charge of W. L. Klatt and E. P. Sylwester, Iowa State College. Dr. Sylwester pointed out in his remarks that only a few years ago, weed control was considered to be a problem to be solved by the individual farmer, and that the extension service had but three full-time experts on weed control. Now, by contrast, "we have a fully alert weed control-minded chemical and equipment industry ready to furnish supplies and equipment for the battle against weeds." He said that for years, chemical weed control has been talked about, but 2,4-D created an intensive interest in weed control. "It remained for the chemical and equipment industry to pick itself up by the boot straps and from a standing start, fulfill one of agriculture's most momentous needs" by furnishing the material and the appli-

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50 gallon self-contained unit with 22 foot Resisto-Rust superior boom — stainless steel with cadmium and galvanized parts. Mounted on our mono-wheel trailer.

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- Special boom for wheat spraying.

100 gallon self-contained unit mounted on Hi-X trailer for row crop clearance.

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**THERE'S A HANSON AGRICULTURAL CHEMICAL TO FIT EVERY INSECT OR WEED CONTROL PROBLEM**

Utility 15 and 22 foot boom in the very low price bracket but value through and through. Can be mounted on almost any vehicle.

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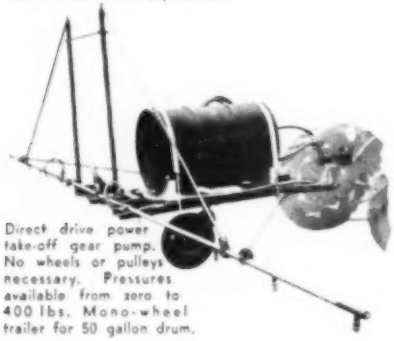
*FOREMOST IN COMBINED CHEMICALS AND EQUIPMENT FOR AGRICULTURE*



Direct drive power take-off gear pump. No wheels or pulleys necessary. Pressures available from zero to 400 lbs. Mono-wheel trailer for 50 gallon drum.

200 gallon self-contained unit with 35 foot Resisto-Rust sulky boom.

cation means for chemical weed control.

But the job of education is never done, he emphasized. In this connection, he mentioned spray drift and danger from contaminated sprayers which must be warned against continually. "People are eager and receptive to authentic weed control information," he reported. "They are looking for us to bring them information based on thorough research."

W. L. Noe, attorney, State Board of Agriculture, Topeka, Kansas, discussed the question, "What do We Need in Herbicidal Laws?" He stated that uniform laws are desirable, and that legislation in the several states must undergo revision and modernization to keep pace with technological developments in chemical weed control. Some of the herbicide laws are "far too strict," he said, but others are too lax . . . enough so that consequences from improper use of chemicals may be serious. One of the main objectives of legislation is to protect the public without restricting unduly the use of useful agricultural tools, he said.

Walter S. Ball, California Dept. of Agriculture, was asked to comment on the subject. He said that there still remains much to be learned about 2,4-D and other herbicides, and that the trade must be careful lest hysteria should influence the passing of laws which would set difficult precedents. He emphasized the necessity of laws being set up on a state level rather than national, since the problems are largely local in nature. "We must be very careful in legislating against a material which is used so widely," he said.

Minnesota's Short Course for Training Weed Workers was described by Sig. Bjerken, St. Paul, Minn. He told how the plan had developed with the county agent and county inspector cooperating in the instruction of users of herbicides.

John D. Furrer, Lincoln, Nebraska, told about the "war on weeds" in his state; and Charles J. Gilbert, Brookings, S. D., discussed "Safety Zones for Weed Control Programs."

The afternoon session of Thursday was under the chairmanship of Dr. Worzella. Section I of the program dealt with machinery and methods of application. This portion of the program was in charge of W. P. MacDonald, Minneapolis, Minn. Other speakers included G. L. Shanks, University of Manitoba, Winnipeg, Man.; and O. K. Hedden, U.S.D.A. The second portion of the program was on the "Industrial Viewpoint" of new herbicides, with W. C. Dutton, Dow Chemical Co., Midland, Mich., in charge. Reports on the newer herbicides were presented by G. F. Warren, Madison, Wisconsin, and George McCall, E. I. DuPont de Nemours & Co., Manhattan, Kansas.

The annual banquet was held Thursday evening, with Arnold P. Benson, Director of the Illinois Department of Agriculture, toastmaster. George E. Metzger, secretary of the Illinois Agricultural Association, Chicago, was the main speaker. He lauded the weed control industry as bringing about a reformation on the farm, and called for more research and campaigns to control weeds.

Dr. Willard reviewed the activities of the past year, and of the four previous years which have witnessed the growth of the weed control conference from a handful of persons to the high mark of nearly 700 registrations at the Springfield meeting. He said that the emphasis in 1948 was research on 2,4-D, but that in 1949 the project will include "herbicides" . . . many kinds.

One of the highlights of the evening program was the presentation to Dr. L. W. Kephart, U.S.D.A. weed control expert, of the Association's first honorary membership. The presentation was made by Dr Willard.

Friday's sessions included three sections on the morning program. These were: "Physiology and Basic Studies," with George McNew, Iowa State College, chairman; "Educational Problems in Weed Control," with Dr. Sylvester chairman; and "Regulatory Problems in Weed Control," with W. L. Klatt, Pacific Coast Borax Co., Brookings, S. D., chairman.

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## Co-op Office in Frisco

United Cooperatives, Inc., Alliance, Ohio, has announced that the co-op's west coast office would be

opened on January 10 in San Francisco . In charge of the new office is R. Wayne Mills, former manager of United's Farm Chemical Department at Philadelphia. Address of the San Francisco office is room 1120, San Francisco Bank Building., 405 Montgomery St.

The opening of the west coast office is expected to bring about closer relationships with the co-op's two member organizations in that area, and also make its farm supply products and services available to farmer cooperatives in the western area, the co-op states.

## HIGH GAMMA BHC

(Continued from Page 43)

less noticeable is the musty odor characteristic of benzene hexachloride.

### Production Problems

THE problem facing manufacturers was then to produce a grade of benzene hexachloride with the highest possible gamma isomer content. The methods by which this has been achieved have been to date both difficult and expensive and the production of high gamma content products is still somewhat limited. A number of manufacturers are still offering insecticides prepared from crude benzene hexachloride containing all of the original isomers produced in the chlorination. About two years ago there appeared on the market an improved technical grade of benzene hexachloride containing 36% of the gamma isomer. This constituted a marked advance over the 12% crudes since it allowed the total benzene hexachloride dosage to be reduced to one-third, thus reducing the phytotoxic hazard and the odor and flavor problem to an equivalent degree.

Not only has the large scale separation of the gamma isomer proved to be a technological and economic problem but even in the analytical laboratory, the accurate estimation of the relative proportions of the isomers has been difficult. A number of analytical procedures have been proposed, which include methods based on crystallization, on infra-red absorption spectra and on chromatographic partition. The last named method, developed by the Pennsylvania Salt Manufacturing Co. (1) appears to offer manufacturers a superior means of determination. It provides reproduceability and ease of operation and employs a simple and inexpensive apparatus. The method has been shown to be sufficiently convenient and rapid for routine production analysis and has the added advantage of requiring no specially trained personnel to operate.

### High Gamma Desirable

SEVERAL manufacturers of benzene hexachloride insecticides have recently been able to offer products based on high gamma concentrates containing 90% or even more of the gamma isomer.

Using the partition chromatographic procedure as an analytical and development tool, Pennsalt has brought into production a new product, "Hi-Gam," (2) containing 92% or more of the gamma isomer.

High gamma concentrate products, tested extensively during the past season, have reduced odors to a large degree. The product cannot be characterized as "odorless," but the penetrating musty odor which has long characterized crude benzene hexachloride, has been replaced by a faint aromatic odor which some users have found to be rather pleasant. Phytotoxic effects are greatly reduced, with use of the high gamma isomer product, as is the danger of affecting the flavor of food crops. During the past season, for example, it was indicated that such a product could be used to control pickle worm on cucurbits (including fruiting cucumbers) without damage either to vines or fruit and with no effect upon the flavor of the fruit.

A considerable amount of alarm about possible contamination of flavor was caused by the early unfortunate use of crude benzene hexachloride insecticides on a number of crops, particularly potatoes. Consequently, it may require some time before this compound is able to assume its proper place as an agricultural insecticide.

At the same time, it would be

unwise and possibly untrue to state flatly that high gamma concentrate benzene hexachloride will completely solve the problem of flavor effects. However, it has already been shown that such products are safe and useful under circumstances where crude BHC would have constituted a hazard. This advancement is partly due to the separation of and removal of impurities which contributed the characteristic sharp musty odor, and partly due to the fact that a much smaller percentage of the total dosage of BHC is needed to obtain a desired dosage. Actually, the desired dosage of gamma isomer can now be had at about 1/10 of the total BHC dosage.

Samples of highly purified gamma isomer of benzene hexachloride have been prepared in the laboratory, but their use is considered impractical, and manufacturers doubt if the use of so pure a product could ever be justified. However, even though such samples are regarded as laboratory curiosities, most observers declare upon inspection, that the highly purified gamma isomers are practically without odor.★★




**Literature Cited**

(1) Determination of Gamma—Benzene Hexachloride by Partition Chromatography. Otto T. Aepli, Paul A. Munter, and John F. Gall. *Analytical Chemistry* 20, 610, July, 1948.
(2) Trade mark of the Pennsylvania Salt Manufacturing Company.


## FERTILIZER SCENE

(*Continued from Page 31*)

food supply is concerned, or much more nearly so than they now are, sharp demand for American agricultural products will continue.

The fertilizer industry offers a product which should sell itself if given a fair chance. The fertilizer trade can stand on results and proclaim these to potential buyers, one and all. No other commodity is bought and used by farmers which brings them bigger returns on their investment. In 1939, a survey of some 32,000 farmers gave their individual opinions whether it paid to use fertilizer. Their composite opinion was that for each dollar spent for fertilizer they received a return of $3.60 in crop increase. At the present time, the rise in prices received by farmers for all farm products (the index being about 290) and the current fertilizer prices (the index being about 155) being taken into consideration, the farmer is apparently receiving $8 in crop value for each dollar invested in fertilizer. This means that, on the average, if a farmer puts $5 worth of fertilizer on an acre of land he can expect a return of additional crops worth $40.

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**New Pennsalt Subsidiary**

Pennsylvania Salt Manufacturing Co., Philadelphia, has announced the organization of Pennsalt International Corporation, a subsidiary, which will handle the foreign interests of the parent company. President of the new firm is Richard L. Davies and John H. S. Barr is vice-president. Mr. Davies is assistant to Leonard T. Beale, president of the parent company. Mr. Barr has been export manager of the Philadelphia firm since 1944.

The newly-organized company will import and export chemicals and

raw materials, as well as functioning in the exchange of technical information relating to chemical processes.

## MARKET REPORT

(*Continued from Page 45*)

The shortage will grow more acute as the manufacturers of the finished dusts get their productions under way. It is expected that the supply will not meet minimum requirements at least in the early part of the manufacturing season.

### Rotenone

ARRIVALS of crude rotenone root from overseas have been in short supply but the finished rotenone powders are not enjoying particularly active demand in the United States. Material is available in the vicinity of 29c lb. for 5% material.

One industry spokesman was quick to point out in connection with the Federal program for the use of rotenone in cattle grub, that there has actually been no appropriation made available as yet, and emphasized further that the industry will still have the job of distributing and making the actual sales in the program.

The majority of those in the industry agree that there will be a tight supply situation and there have been many trade letters urging buying while stocks are still available in the hands of rotenone grinders.

### Copper Chemicals

THERE has not been a great deal of activity in copper fungicides during the normal activity usually expected at the height of the Florida season. However, with increasing shortages of copper metal itself, there is considerable talk in the metal circles that the price of copper may increase once again. However, spokesmen of the copper fungicide manufacturers are afraid that any additional increases in the metal price and corresponding increase in the fungicides will work to the detriment of the use of copper in agriculture during the coming year.

A recent publication issued by the Canadian Department of Trade and Commerce should be of direct interest to those dealing in pesticide chemicals. Included is the first statistical survey of the sales of pest control products by Canadian registrants for the calendar year 1947. The publication incidentally may be obtained from the Canadian Department of Trade & Commerce, Ottawa, Ontario.

The volume of pest control products by Canadian registrants which includes such materials as herbicides, household and industrial insecticides, disinfectants and rodenticides, and seed treatments, amounted to $9,749,772 at wholesale prices.

## THE TEST OF TIME

(*Continued from Page 41*)

*pared with chemical fertilizers the manure usually has been used in such amounts as to carry far larger quantities of the essential elements of fertility than those given in the chemicals* and, without stopping to consider this point, the carbonaceous matter of the manure has been credited with the superior effect produced.

"So firmly has the idea become fixed in the average mind that manure possesses fertilizing properties additional to those due to its chemical constitutents, that the suggestion that chemicals may be so employed as to equal the effect of manure, pound for pound of nitrogen and mineral elements contained, has been taken as an attempt to depreciate the value of manure.

"What the experiments described in the foregoing chapter are believed to teach is that manure, as used in ordinary farm practice, owes its value to the nitrogen and inorganic elements contained, and that, by employing manure in the light of the knowledge which modern science has given us, we may very greatly increase its value."

Referring back to the 95-year Rothamsted experiment, it is important to note that, although the land was plowed every year in preparation for seeding the wheat, the newly seeded plants soon formed a soil cover. Any bare spaces were filled in with weeds. In the West Virginia experiment, only 4 of the 15 crops that were grown were of clean-culture type. In the Ohio experiment, only one year in four was devoted to a cultivated crop. These cases are far different from what is going on over a large part of the cotton, corn, soybean, potato, and vegetable-growing areas of this country. In proportion as the land is used more frequently for producing cultivated crops, less opportunity is provided for the legumes and grasses, and these are the organic matter-accumulating crops. When soil is used for the production of such plants as corn, it is exposed to the beating action of heavy rainfall, the rate of loss of topsoil is accelerated, and the rate of decomposition of soil organic matter is speeded up. Growing such crops does not result in an accumulation of soil organic matter, but rather in its reduction.

The point is that fertilizers are being substituted for good farm management over vast areas of land in the United States. Too large a percentage of the land on many farms is being devoted to cultivated crops. This means that the recovery processes, which are associated with the legume and other sod crops, are not being permitted to operate, so that neither the physical nor the chemical properties of soils can be restored.

Conditions with respect to soil deterioration are especially troublesome in the United States. The rainfall around New York, Chicago, St. Louis and New Orleans ranges between 40 and 60 inches annually, and it often comes in torrents. In contrast, the annual rainfall around London, Paris and Berlin is about 25 inches, and it usually comes in gentle showers. Our agriculture is distinctly of the clean-culture type, 150 million acres of row crops being planted every year. Over two million tractors are being used to tear up and run over the soil. A good many thousands of acres of land that once were covered with hay and pasture crops for horse-feed purposes,

have been torn up by the plow. Many miles of fences that served as barriers to the movement of soil have been removed so the tractor and truck can go farther and faster. The leisurely pace of the horse-and-buggy days has yielded to speed, and this applies to the rate at which water, and the soil that is carried long with it, are going down hill.

More attention will have to be paid to protecting the land against this type of damage. Such soil deterioration is not necessarily the fault of the fertilizer industry, but it has been made possible by that industry, and the industry cannot escape its share of the responsibility for it. Without fertilizers, we would long since have been compelled to adopt better systems of soil management. Otherwise we would have gone hungry during World Wars I and II.

Even with adequate amounts of fertilizers at our disposal, we are not too sure about what the situation with respect to the supplies of food and fiber will be, let us say, in the year 2000. Our population is growing at a rate that averages more than a million people per year. This means that the margin of safety between plentiful food supplies and ever-increasing numbers of people is growing smaller.

*It is high time that the fertilizer industry began to think seriously about the means by which land can be kept productive without the use of fertilizer.* It would be well advised to conduct an educational campaign and finance research projects on the value of sod crops, the possibilities in the growing of legumes, the practices by which soil erosion can be brought under control, and the means by which badly eroded land can be restored to usefulness.

The current outcry of the organic-farming advocates is a mere "tempest in a teapot" in comparison to what may happen if the industry fails to put a stop to the use of fertilizer as substitute for soil conservation. Fertilizers will, if rightly employed, *make poor land good.* But it would be more in keeping with their potentialities if they were used to *make good land better.*★★

## AAE MEETING

(*Continued from Page 29*)

make recommendations for solution. The farm press, he said, tended to cause mass hysteria through published articles against DDT, parathion and BHC. This, he said, can lead to hasty state legislation to restrict the use of useful toxicants. The economic entomologist may be forced to follow through on control recommendations so that wise legislation may be formulated during the period of transition, he stated. Mr. Willis also saw a lack of coordination in various groups seeking answers to entomological questions, and suggested that an over all plan of research should be offered to both the entomologists and the chemical manufacturing industry. He said that the food industry is at present formulating such a plan. The final session was Thursday afternoon. Papers read at various sections numbered 101 at the meeting.★★

# Industry Patents

2,453,368. Spray Operating Mechanism. Patent issued November 9, 1948, to Alfred D. Goodwin, Mateca, Calif. A spray machine including an upstanding tower, a vertically adjustable supporting member on the tower, a horizontal rock shaft journaled on the supporting member, a nozzle secured transversely on the rock shaft, and power means operative to rock said shaft irrespective of the position of vertical adjustment of the supporting member; said power means including a driven vertical shaft mounted in connection with the tower, said driven shaft having a vertically slidable but relatively non-rotatable sleeve thereon, and a wobble plate unit connected between said sleeve and the rock shaft.

2,453,983. Prevention and Destruction of Weeds. Patent issued November 16, to Wilfred A. Sexton, Manchester, and Roland Edgar Slade and William Gladstone Templeman, Bracknell, England, assignors to Imperial Chemical Industries, Ltd. A method for the prevention and destruction of weeds which comprises applying to a locus to be protected a compound conforming to the general formula $Ar.X.CH_2Y$, in which Ar is selected from the group consisting of the phenyl radical, the naphthyl radical and such radicals containing also at least one substituent selected from halogen atoms, nitro groups, and alkyl radicals containing not more than 6 carbon atoms, X is selected from the group consisting of oxygen, sulphur, and —NH— radical, and Y is selected from the group consisting of the carboxy radical and carboxy radicals in which the hydrogen atom is replaced by a water-soluble salt-forming substituent, the compound being applied in amount sufficient to exert an herbicidal action.

2,454,061. 2-Ethyl-Hexyl, N-Octadecyl Tetrachlorophthalamidate and Insecticidal Compositions Containing the Same. Patent issued November 16, to Mark L. Hill, Delaware County, and Herschel G. Smith, Wallingford, Pa., assignors to Gulf Oil Corp., Pittsburgh, Pa. The compound, 2-ethyl-hexyl, N-octadecyl tetrachlorophthalamidate. An insecticidal composition comprising from about 0.1 to 10.0 per cent by weight of 2-ethyl-hexyl, N-octadecyl tetrachlorophthalamidate and a hydrocarbon solvent therefor.

2,454,339. Sprayer. Patent issued November 23, to S. F. Potts, Hamden; and R. A. Spencer, Stafford Springs, Conn.; dedicated to the free use of the people of the United States. A sprayer provided with a blower for producing a high velocity and volume of air, a nozzle through which the air is ejected mounted on the blower, a pump for pumping liquid material into the air stream and a power means for operating the blower and pump, characterized in that the blower, pump and power means are mounted on a truck having projecting handles for guiding and propelling the same, the blower being mounted to pivot in a substantially vertical plane and a handle of the truck being provided with a control mechanism for pivoting the blower.

2,454,662. Device for Mixing Fertilizer with Soil and Screening. Patent issued November 23, to James Marsh, Bay City, Mich. In a screening device of the character described, a mobile frame, a soil hopper mounted thereon, a screw conveyor in said hopper, a sifter drum in substantially horizontal alignment with the conveyor and into which said conveyor discharges, a fertilizer hopper interposed between the soil hopper and the drum, means operable by the conveyor flight for discharging predetermined quantities of fertilizer into said conveyor at predetermined intervals, a power plant, and independent driving means for drivingly connecting said screw conveyor and or said sifter drum with the power plant, and driven means in said drum and rotatable in a direction opposite to the rotation of the drum for agitating and fluffing the soil as the mechanism is driven.

2,455,190. Extracting Potash from Wyomingite. Patent issued November 30, to Robert D. Pike, Pittsburgh, Pa. That method of extracting potash from Wyomingite comprising treating only all of the fresh Wyomingite in a first autoclave under steam pressure with solution from a second autoclave, separating partly exhausted tails from the solution from said first autoclave, treating said tails in said second autoclave with that amount of fresh sodium carbonate substantially theoretically equivalent to potash in the fresh Wyomingite treated in said first autoclave, separating exhausted tails from the solution from second autoclave and passing the solution to the first autoclave, crystallizing and separating from the solution from said first autoclave sodium carbonate and then sodium potassium carbonate, and producing a mother liquor containing potassium carbonate.

2,456,324. Insecticide Dispenser. Patent issued December 14, to William L. Roessner, Denver, Colo. In a jar-like container for liquid insecticides having an open end, a supporting closure and dispensing means for said container comprising a closure wall fitted over the open end of said container and embracing the side walls thereof adjacent the opening, said end closure wall consisting of an outer non-absorbent part and an inner absorbent lining having a series of hollow protuberances extending outwardly therefrom, the walls of the protuberances being thinner at their outer ends than at their bases, and said protuberances being arranged adjacent the side walls of the container to obtain rigid support therefrom, whereby the outer ends of said protuberances consisting of the non-absorbent part only may be readily removed to provide dispensing openings therethrough by abrasion of said ends on an abrasive surface without forming an opening in the lining and distortion or collapsing thereof or of said end wall for subsequent steady support of the inverted container in spaced relation to a supporting surface.

## Trade Mark Applications

PESTMASTER, in capital letters, for insecticide in powder form used for the control of insects. Filed Sept. 5, 1946, by Michigan Chemical Corp., Saint Louis, Mich. Claims use since July 15, 1945.

FICO, in tall capital letters, for sulphur. Filed Apr. 12, 1948, by Stauffer Chemical Co., San Francisco. Claims use since May 29, 1917.

DURA DUST, in capital letters, underlined, for agricultural and horticultural insecticides. Filed Oct. 4, 1947, by Acme White Lead & Color Works, Detroit, Mich. Claims use since Sept. 8, 1945.

GY-KIL, in slender capital letters, for insecticides. Filed Dec. 10, 1947, by Geigy Co., Inc., New York. Claims use since Nov. 19, 1947.

ORICONCURE, in diamond-shaped box imprinted over vertical column on which are pictured fruits and vegetables, for fertilizer. Filed Oct. 24, 1947, by Atkins & Durbrow, Inc., New York. Claims use since January, 1946.

MIDWESTERN, in outline capital letters arranged in an arc, for fertilizer compounds made up of organic and morganic chemicals, primarily nitrogen, phosphate and potash or any of such ingredients alone and unmixed. Filed Nov. 18, 1947, by Midwestern Phosphate Corporation, Madison, Wis. Claims use since July 16, 1945.

DRAWING OF WINGED ANIMAL, for various chemical compounds including insecticides, namely: DDT solutions and dust mixtures, pyrethrum, and sulfur. Filed Aug. 19, 1947, by Griffin Chemical Co., San Francisco. Claims use since March 5, 1935.

WB, initials on picture of can, with city buildings as background, for insecticides, germicides, antiseptics, and fungicides. Filed Oct. 18, 1947, by A. Reed Wilson Co., Kansas City, Mo. Claims use since Nov. 10, 1932.

"GY-BEN," in slender capital letters, for insecticides. Filed Dec. 5, 1947, by Geigy Co., Inc., New York. Claims use since, Oct. 27, 1947.

# Classified Advertising

**Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.**

## Positions Open

**Entomologist Wanted:** To head service department of large pest control firm with home office in Pittsburgh and branches in several cities. Candidate should have several years of field experience and preferably Ph. D. Duties would include handling sizable staff of service-men, training new men for pest control work, supervising insecticide formulations. This is a "big" job with unlimited possibilities. There is available a nice five-room, two-bedroom apartment at very reasonable rental. Submit complete data on training, experience, salary requirements and photo. Strictly confidential. Address: Mr. L. C. Crosby, President, Commonweath Sanitation Co., 3567 Bigelow Blvd., Pittsburgh 13, Pa.

**Chemical Sales:** A leading eastern chemical manufacturer requires services of young man with some experience in the industry to handle sales correspondence, follow-up salesmen's reports, assist sales manager generally. Excellent opportunity. Give full details, education and experience. Address Box 308, care of Agricultural Chemicals.

**Require Graduate:** Agricultural field. Require a graduate in basic agricultural plant sciences, preferably in entomology. Sales and service. Willing to travel. Car necessary. New product. National organization. Headquarters in Chicago. Salary plus expenses and car allowance. Real future. Address Box 309 care of Agricultural Chemicals.

## Positions Wanted

**Entomologist, Ph.D.** Desires position in technical service with firm engaged in manufacturing or sale of agricultural chemicals. 12 years experience in fields of insecticides, fungicides, and herbicides with state and commercial agencies. Excellent references. Address Box 310 care of Agricultural Chemicals.

**Entomologist:** Desires position to assist in biological and chemical tests of insecticides. Able to do stenographic work. Address Box 311, care of Agricultural Chemicals.

**Salesman:** Age 40, responsible, capable, well established, 18 years traveling entire Pacific Northwest territory, past 4 years in sales of household and commercial type insecticides to dealers, jobbers, institutions, industrial and commercial accounts. Direct and supervisory sales experience. All experience in specialty and promotional sales. Desires above average lifetime sales connection based on sales ability and knowledge rather than technical knowledge of chemicals, with manufacturer who offers strong future possibilities. Preferably on straight salary or salary and commission basis to start. Assure high-class, aggressive, dignified and intelligent representation. Address Box 312, care of Agricultural Chemicals.

**Chemicals:** New connection wanted by man with thirty years broad experience in selling and administration in chemicals, paints, petroleum, detergents, etc. Located west coast; San Francisco location preferred. Knows coast trade. For further details, write Box 313, care of Agricultural Chemicals.

**Insecticides:** Salesman with ten years experience with two nationally-known manufacturers of basic insecticide and allied materials desires sales position with manufacturer. Will travel anywhere. Will supply full information. Address Box 314, care of Agricultural Chemicals.

**Horticulture or Entomology:** Veteran desires work in Horticulture or

Entomology. BS and MS degrees from Texas Agricultural and Mechanical College. Three years experience in landscape, vegetables and research and teaching. Age 25, wife and three children, prefer research. Will work anywhere. Present income $6,000. I am a worker and have callouses on my hands to prove it. RT-1, Box 358-A, Bryan, Texas.

### Miscellaneous

**Wanted Business:** Chemicals, fertilizers, insecticides, veterinary supplies, feeds or seeds, manufacturing, wholesale or retail, by live wire sales manager now employed. Present volume of business secondary. Outright purchase or partnership or similar arrangements considered. All correspondence strictly confidential. Address Box 315, care of Agricultural Chemicals.

**Equipment Wanted:** One used, but in operating condition, insecticide dust mixer not exceeding 1000 lb. capacity. State make, condition, capacity and price first letter. Address Box 316 care of Agricultural Chemicals.

**For Sale:** Fungicide carrier stable solution. Use your preferred fungicide with our carrier. Distributors wanted. Frank J. Zink Co., Dept. A-6, 141 W. Jackson Blvd., Chicago 4, Illinois.

■

### Florida Hort. Officers

The Florida Horticultural Society at its recent meeting at Tampa, named the following officers for 1949: president, Frank Stirling, Davie, Fla.; vice-president, citrus section, Leo H. Wilson, Bradenton, Fla.; vice-president, Krome Memorial Institute, S. J. Lynch, Miami; vice-president, vegetable section, George Cooper, Princeton, Fla.; vice-president, ornamental section, N. A. Reasoner, Bradenton, Fla.; vice-president, processing section, Dr. M. K. Veldhuis, Winter Haven, Fla.; and secretary-treasurer, Dr. Ralph L. Miller, Plymouth, Fla.

■

### New Fertilizer S.M.

The Southern California Fertilizer Company, Los Angeles, has announced the appointment of L. W. Campbell as sales manager. Mr. Campbell was for 12 years employed as manager of the Spray, Oil and Insecticide department of the Tidewater Associated Oil Co. of California, during which time he worked throughout the Pacific Coast area.

## Advertisers' Index



*(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)*

## TALE ENDS

CHRISTMAS cards by the dozen sent to Agricultural Chemicals and members of the staff are hereby gratefully acknowledged.

•

"Toxaphene" is shortly to become toxaphene, as Hercules Powder Co. surrender their rights in this trademark and make possible its adoption as a common name for insecticides of the chlorinated camphene variety. Assists are credited on the play to Red Rohwer of the U.S.D.A. and Paul Mayfield of Hercules. Incidentally, more moves of this sort can be anticipated in the very near future, as further progress is made toward simplification and standardization of insecticidal and fungicidal nomenclature.

•

The gavel presented to Dr. Valleau, newly-elected president of the American Phytopathological Society at the group's Pittsburgh meeting, was said to be made from the famous "Washington Elm," at Berkeley Springs, W. Virginia. The Phytopaths will no doubt prize the new gavel from its historic background, of course. But also, it serves to remind them of Dutch elm disease which is destroying thousands of old trees in various sections of the country. As "plant doctors," they are seeking remedies for the disease.

•

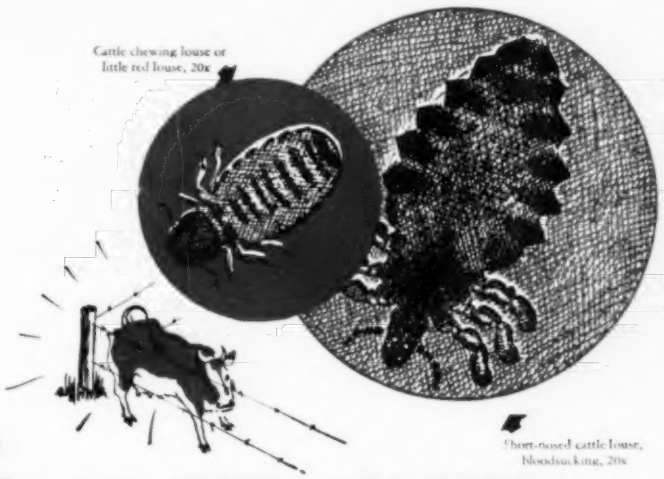
L. W. Kephart, U.S.D.A. weed expert, became the first honorary member of the North Central Weed Control Conference at a brief ceremony at the group's annual banquet, December 9. In his acceptance remarks, Mr. Kephart recalled the days 'way back when chemical weed control was handled by literally two or three persons in the entire U. S. Facing a banquet crowd of nearly 800 at Springfield, representing one of four such conferences, the U.S.D.A. weed control chief could not help but remark about the distance weed control has come within the past few years.



PRINTED BY WAVERLY PRINTING CO., BALTIMORE

## CATTLE LICE

(*Bovicola bovis*—chewing louse)
(*Haematopinus*—bloodsucking louse)



Cattle chewing louse or little red louse, 20x

Short-nosed cattle louse, bloodsucking, 20x

# BUG OF THE MONTH

*. . . controlled with Benzene Hexachloride*

LARGE scale tests, both laboratory and field, show that Benzene Hexachloride is a very effective material for the control of all species of lice on livestock. Since BHC kills lice and eggs at the same time, complete eradication of lice is possible with one treatment, if every animal in the herd is thoroughly treated.

Here is a marketing opportunity for the off-season. Lice are most abundant during the winter, hatching in from one to two weeks, and reaching egg-laying adulthood in another two weeks. Consequently they usually increase tremendously during the winter and early spring if not thoroughly controlled.

Benzene Hexachloride is the only material so far developed that will kill both lice and eggs, when properly prepared and formulated. Prentox BHC Powder, containing 10% of the active gamma isomer dispersed in carriers of the proper particle size range, is an ideal starting point for such formulation. It can be blended in simple dust-mixing equipment, and offers a winter-season specialty with sure-fire sales appeal.

*Write for further information on this profitable new development.*

Complete control with BHC Promises greater milk production.

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PRENTOX PEST-TESTED CONCENTRATES SOLD TO
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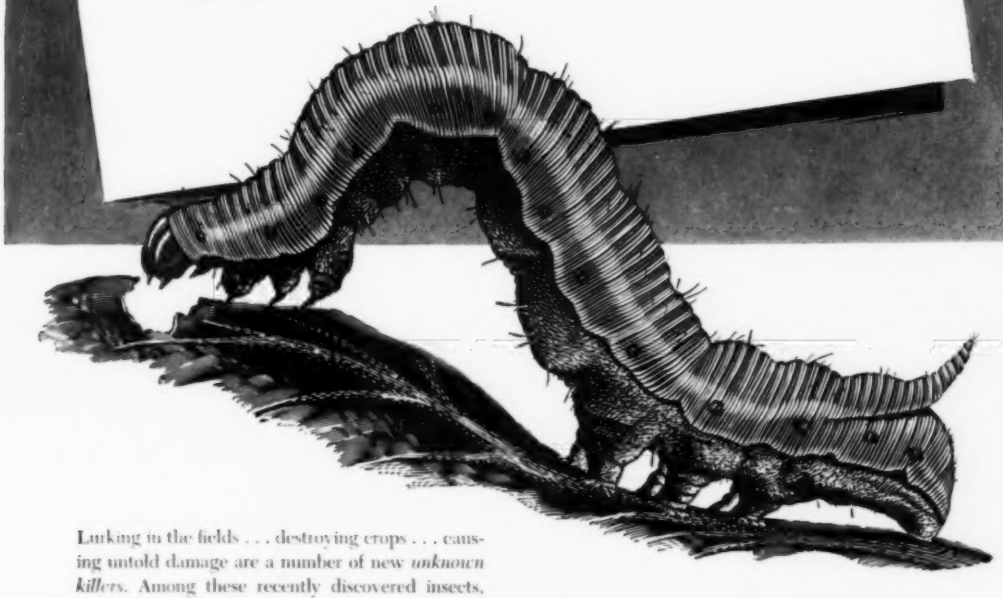
DDT CONCENTRATES • SABADILLA DUST CONCENTRATE • PYRETHRUM PRODUCTS • CHLORDANE CONCENTRATES • CUBÉ POWDER

# UNKNOWN ENEMY!



Lurking in the fields . . . destroying crops . . . causing untold damage are a number of new *unknown killers*. Among these recently discovered insects, one particularly voracious marauder seemed to defy all types of control—until growers tried *Pyrenone Triple Mix Dust.**

We still don't know this culprit's name, but we do know that he quickly succumbs to a treatment of Pyrenone Triple Mix Dust. And we know, too, that Pyrenone Triple Mix Dust is highly effective against more familiar tough-to-kill insects—like the Mexican Bean Beetle...the Tobacco Horned Worm . . . the Leaf Hopper . . . and the Cabbage Looper.

And economical pyrenone agricultural insecticides furnish their highly effective control *without hazard of toxicity*—either from dusts, spray mists, or residues.

Plan now to offer your customers pyrenone-type insecticides next season. For further information just write or phone your nearest U.S.I. office.

**A combination of piperonyl cyclonene, pyrethrins and rotenone*

**U.S.I. INDUSTRIAL CHEMICALS, INC.**

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